

Service Guide

IntelliVue Patient Monitor

MP40/50

Patient Monitoring

PHILIPS

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1

Introduction

This Service Guide contains technical details for the IntelliVue MP40 and MP50 Patient Monitor, the measurement modules, the Multi-Measurement Server (MMS), and the Measurement Server Extensions.

This guide provides a technical foundation to support effective troubleshooting and repair. It is not a comprehensive, in-depth explanation of the product architecture or technical implementation. It offers enough information on the functions and operations of the monitoring systems so that engineers who repair them are better able to understand how they work.

It covers the physiological measurements that the products provide, the Measurement Server that acquires those measurements, and the monitoring system that displays them.

Who Should Use This Guide

This guide is for biomedical engineers or technicians responsible for troubleshooting, repairing, and maintaining Philips' patient monitoring systems.

How to Use This Guide

This guide is divided into eight sections. Navigate through the table of contents at the left of the screen to select the desired topic. Links to other relevant sections are also provided within the individual topics. In addition, scrolling through the topics with the page up and page down keys is also possible.

Abbreviations

Abbreviations used throughout this guide are:

Name	Abbreviation
IntelliVue MP40/MP50 Patient Monitor	the monitor
Multi-Measurement Server	MMS
Measurement Server Link	MSL
Medical Information Bus	MIB
Anesthetic Gas Module	AGM

Responsibility of the Manufacturer

Philips only considers itself responsible for any effects on safety, EMC, reliability and performance of the equipment if:

- assembly operations, extensions, re-adjustments, modifications or repairs are carried out by persons authorized by Philips, and
- the electrical installation of the relevant room complies with national standards, and
- the instrument is used in accordance with the instructions for use.

To ensure safety and EMC, use only those Philips parts and accessories specified for use with the monitor. If non-Philips parts are used, Philips is not liable for any damage that these parts may cause to the equipment.

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Passwords

In order to access different modes within the monitor a password may be required. The passwords are listed below.

Monitoring Mode: No password required

Configuration Mode: 71034

Demo Mode: 14432

Service Mode: 1345

Consult the configuration guide before making any changes to the monitor configuration.

Warnings and Cautions

In this guide:

- A **warning** alerts you to a potential serious outcome, adverse event or safety hazard. Failure to observe a warning may result in death or serious injury to the user or patient.
- A **caution** alerts you where special care is necessary for the safe and effective use of the product. Failure to observe a caution may result in minor or moderate personal injury or damage to the product or other property, and possibly in a remote risk of more serious injury.

NOTE When an IntelliVue MP40/MP50, software revision B.0 with battery option installed is used together with an IntelliVue Infromation center D.01 or E.0 and the monitor issues battery-related INOPs, these INOPS are displayed as “UNKNOWN” on the IntelliVue Information Center. Upgrade the Information Center text catalog to E.01 if using an MP40/MP50 monitor with the Information Center.

2

Theory of Operation

Monitor Theory of Operation

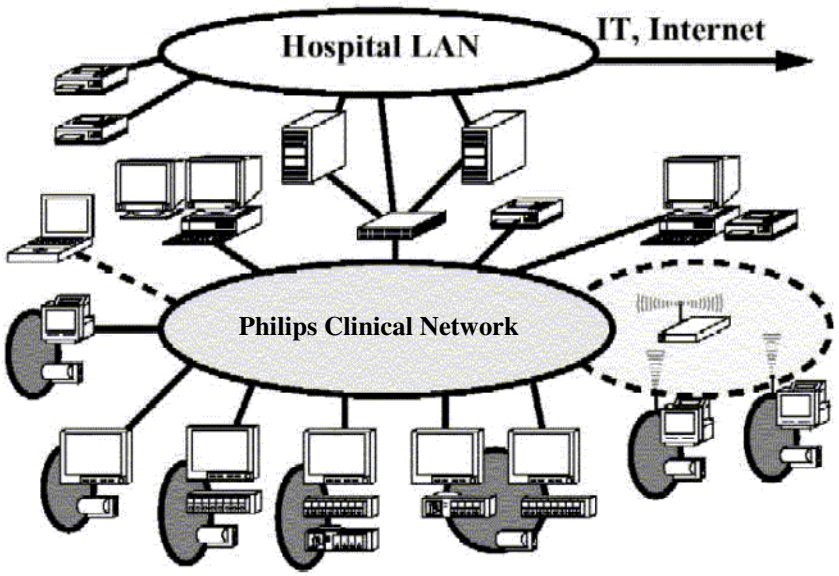
The IntelliVue MP40/MP50 Patient Monitor:

- displays real-time data
- controls the attached measurement server
- alarms in the case of patient or equipment problems
- offers limited data storage and retrieval (trending)
- interfaces to the Philips Clinical Network and other equipment

A monitor with just a single integrated measurement server can be connected to additional building blocks to form a monitoring system with a large number of measurements, additional interface capabilities and one slave display. These elements cooperate as one single integrated real-time measurement system.

System Boundaries

The following diagram discusses specific boundaries within the overall system with respect to their openness and real-time requirements:



	Measurement LAN combines components of one patient monitor; real time requirements across all interconnected elements
	Philips Clinical Network (wired LAN) connects multiple patient monitors, information centers, application servers; closed system, only Philips qualified products (tested and with regulatory approval) are connected, Philips is responsible for guaranteed real-time functionality and performance
	Philips Clinical Network (wireless) like Philips Clinical Network (wired) LAN, however due to current wireless technologies available it has reduced bandwidth, longer latencies, reduced functionality
	Hospital LAN, Internet Standard Network, not under Philips control, no guaranteed service, no real-time requirements

Hardware Building Blocks

The following hardware building blocks make up the monitoring system:

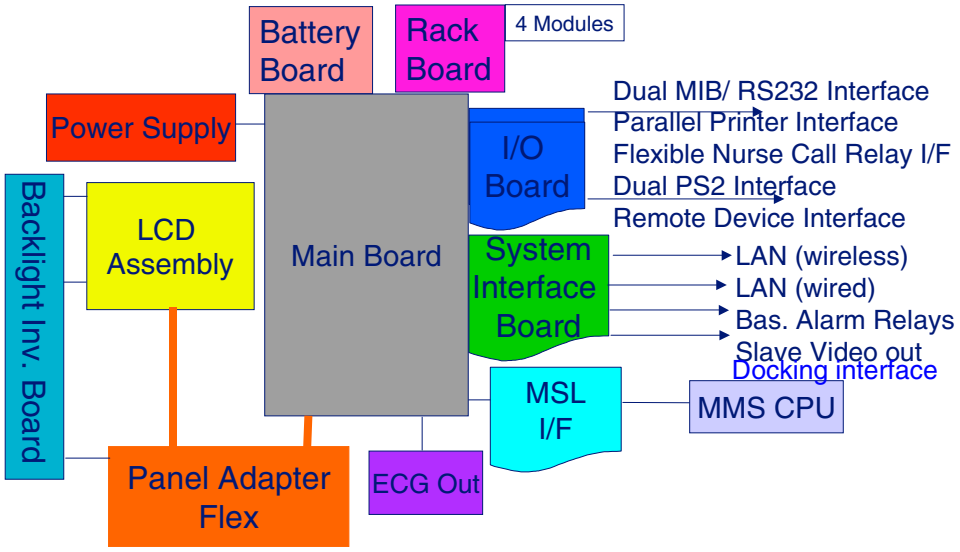


IntelliVue MP40

The MP40 monitor:

- integrates the display and processing unit into a single package
- uses a 12.1” TFT SVGA color display
- uses the Philips Navigation Point as primary input device; computer devices such as mice, trackball, and keyboard can be added optionally
- has an optional 4-slot rack
- supports the MMS and MMS extensions.

Building Blocks:

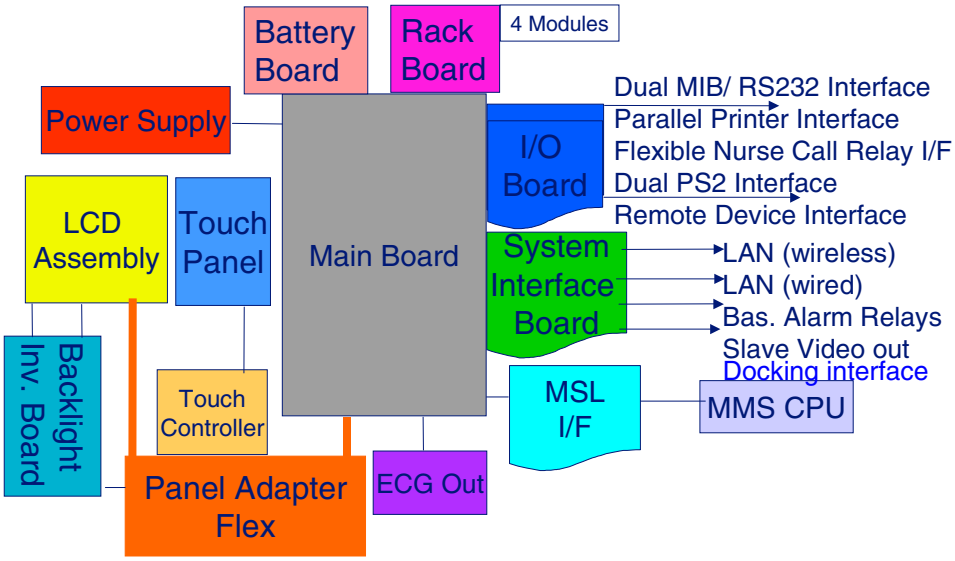


IntelliVue MP50

The MP50 monitor:

- integrates the display and processing unit into a single package
- uses a 12.1" TFT XGA color display
- uses the Philips Touchscreen and Philips Navigation Point as primary input devices. Computer devices such as mice, trackball, and keyboard can be added optionally.
- has an optional 4-slot module rack
- supports the MMS and MMS extensions

Building Blocks:



Optional Hardware

An integrated 4-Slot module rack and a battery board can be ordered optionally. One slot is provided for one of two available system interface boards. If the monitor is ordered with the wireless LAN option a wireless transmitter is required. For further details regarding the wireless network please refer to the M3185A Philips Clinical Network documentation.

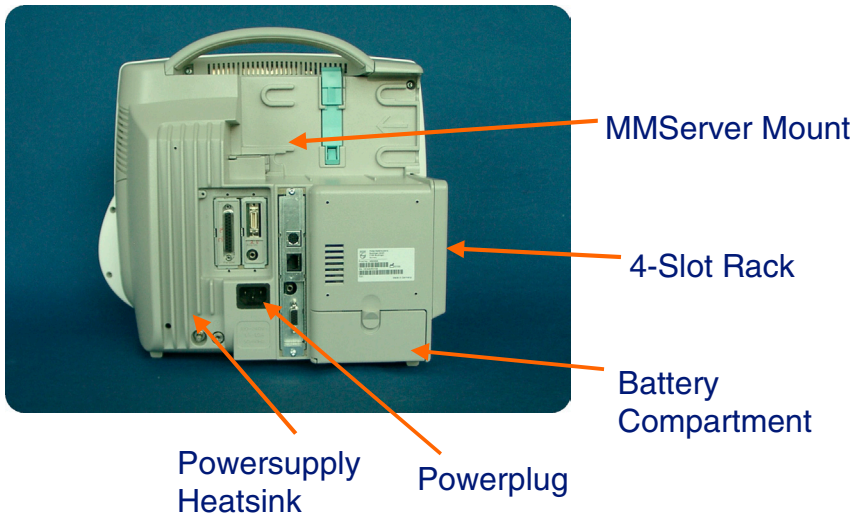


Figure 1 MP40/50 Rear

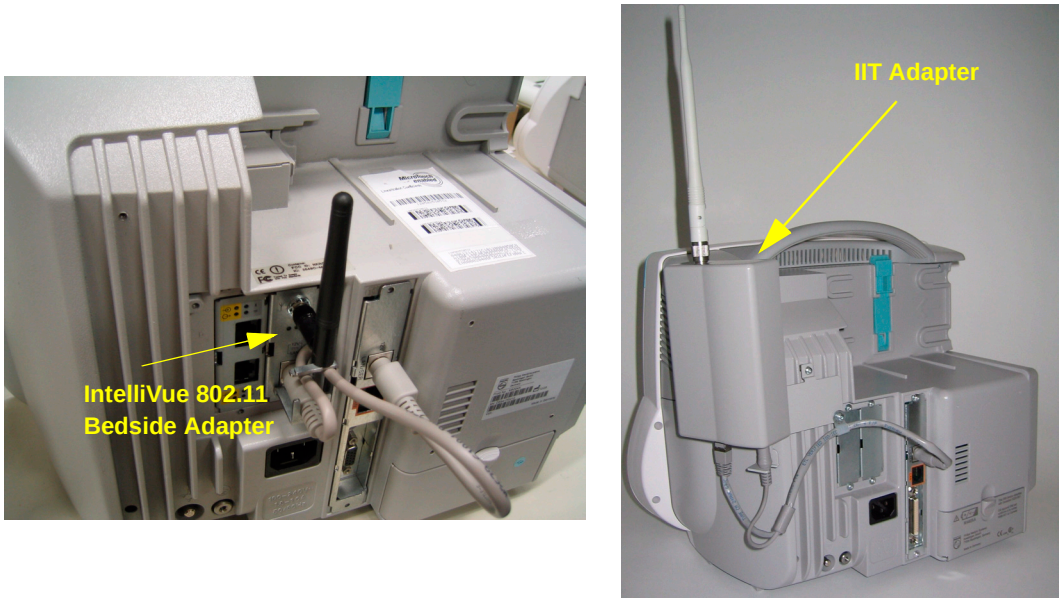


Figure 2 MP40/50 Rear with internal IntelliVue 802.11 Bedside Adapter (left) and with external IIT Adapter (US only) (right)

NOTE The IntelliVue 802.11 Bedside Adapter and the IIT Adapter require a monitor with Software Rel. C.0 or higher.

Compatible Devices



Figure 3 M8045A Docking Station



Figure 4 M3001A Multi-Measurement Server (MMS)

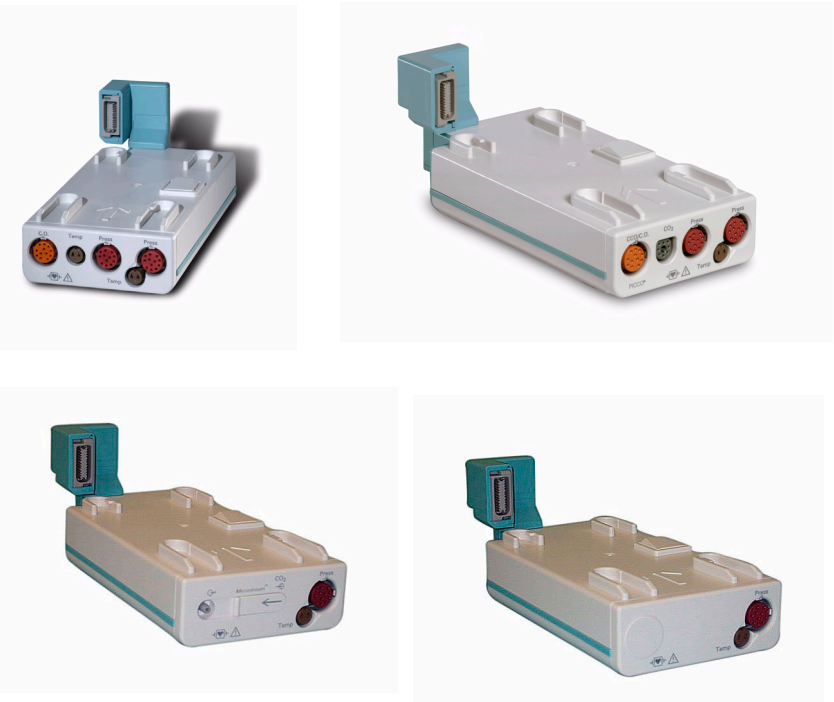


Figure 5 M3012A, M3014A, M3015A, M3016A MMS Extensions

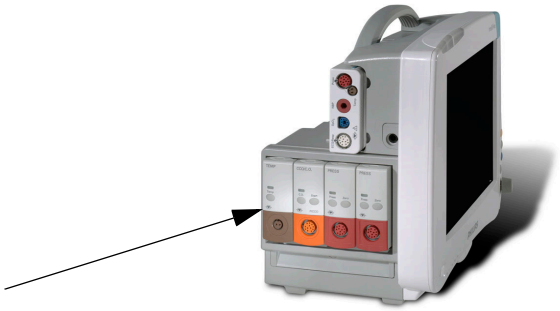


Figure 6 Parameter Modules

List of supported modules:

- M1006B Invasive Blood Pressure Module
- M1029A Temperature Module
- M1012A Cardiac Output / Continuous Cardiac Output Module
- M1018A Transcutaneous Gas Module
- M1020B SpO_2 Module
- M1027A EEG Module
- M1034A BIS Module
- M1116B Thermal Array Recorder Module
- M1032A VueLink Device Interface Module

Power Supply

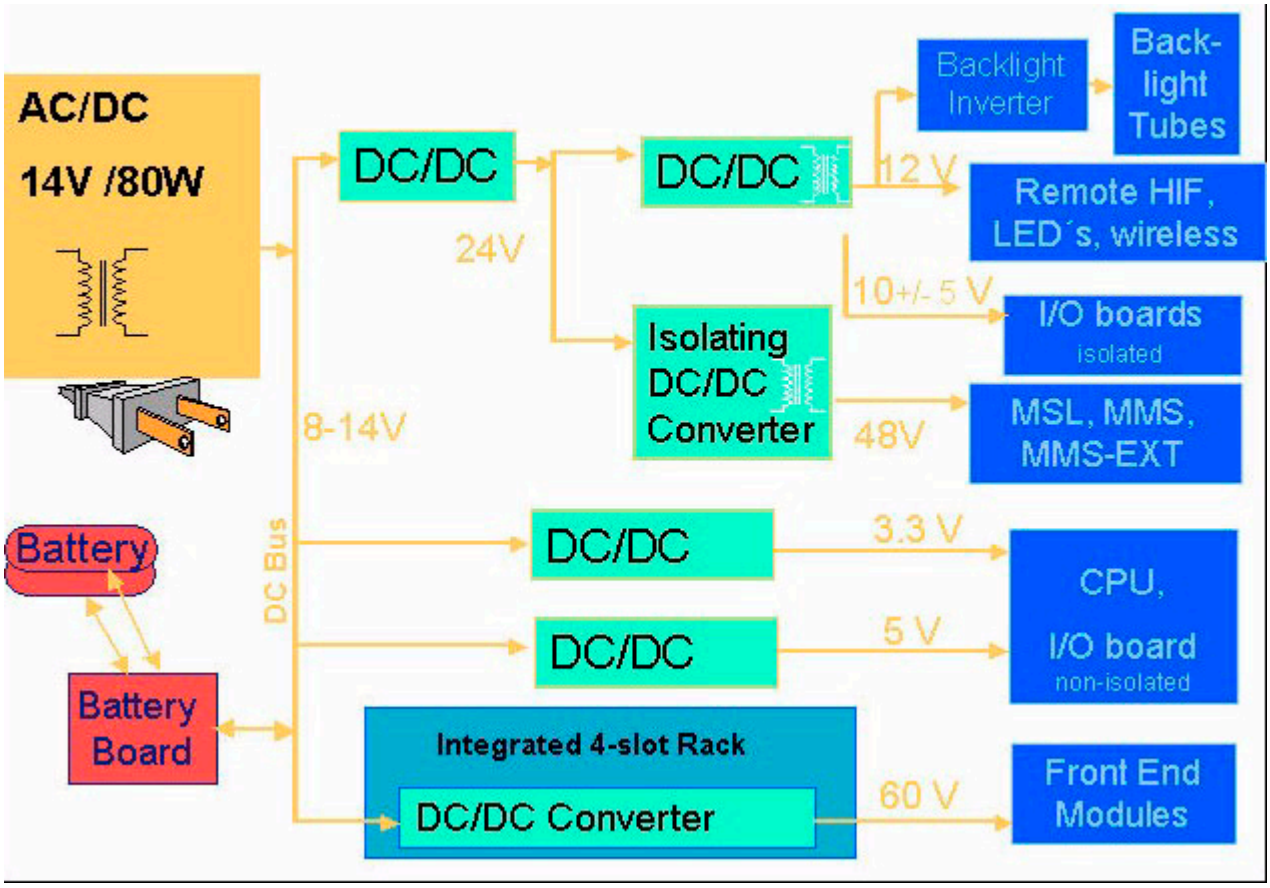
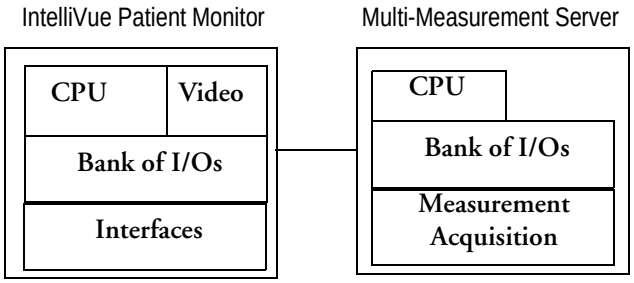


Figure 7 Power Supply Architecture

The AC/DC converter transforms the AC power coming from the power plug into 14 V/80W DC source and isolates the monitoring system from the AC power mains.The 14V is distributed via power bus and supplies power to all the components of the system: The 48V DC power needed for the MMS and measurement server extension is created by an isolating DC/DC converter. The power needed for the backlights is converted to 12V DC by the backlight DC/DC converter. The CPU and the non-isolated I/O boards are supplied with 3.3 V and 5 V DC power. Isolated interface boards require a power of 10V AC. The remote HIF board and the LEDs are supplied with 12V DC power.

CPU Boards

The CPU boards have an MPC852/50 MHz processor in the patient monitor and an MPC860/50MHz in the MMS that provides a number of on-chip, configurable interfaces. An array of fast UARTS with configurable protocol options are implemented in an ASIC (along with other system functions such as independent watchdogs etc.), providing interfacing capabilities to measurement modules and System Interface and I/O boards. The serial interfaces can easily be electrically isolated. The main board contains additional video hardware.



The CPUs provide two LAN interfaces to interconnect CPUs (via the MSL) and to connect to the Philips Clinical Network.

The CPU capabilities are identical. Different loading options are coded on serial EEPROMs to support the automatic configuration of the operating system at boot time.

System Interface and I/O Boards

Interfaces to the monitor are implemented via I/O boards. The location of these boards is restricted by general rules. The I/O slot designations diagram and the I/O matrix which outline the I/O board placement rules can be found in the *Installation Instructions* section.

The following is a list of Interface (I/O) boards which may be present in your monitor, depending on your purchased configuration:

System Interface boards:

- MSL
- Video for slave display
- Philips Clinical Network (LAN wired or wireless)
- Basic Alarm Relay (Nurse Call)
- Docking Interface

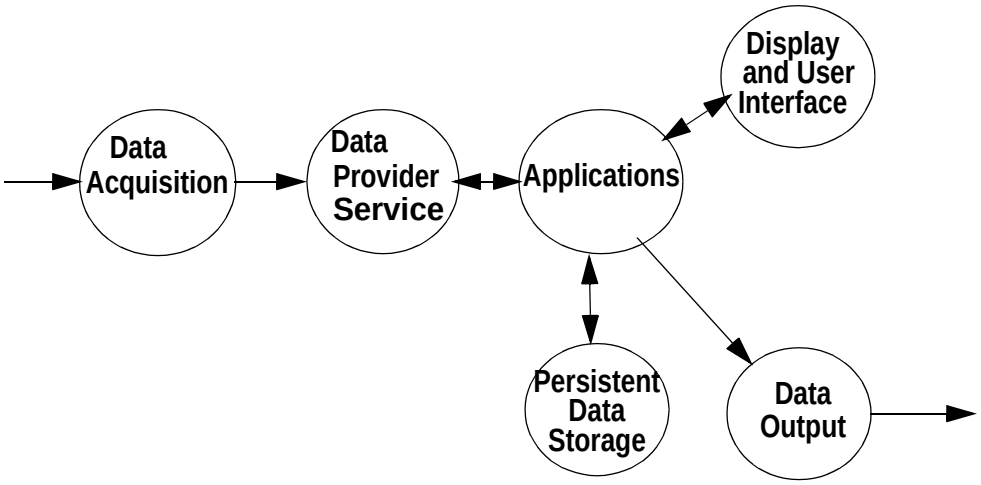
I/O boards:

- PS/2
- MIB/RS232
- Flexible Nurse Call
- Parallel printer
- Remote devices (Remote Alarm Device, Remote Extension Device)
- IntelliVue 802.11 Bedside Adapter

The specifications for the above listed interfaces can be found in the technical data sheet for the monitor and in the *Installation and Specifications* chapter of the Instructions for Use.

Data Flow

The following diagram shows how data is passed through the monitoring system. The individual stages of data flow are explained below.



Data Acquisition

Monitoring data (for example patient measurement data in the form of waves, numerics and alerts) is acquired from a variety of sources:

- Measurement Server

 The Measurement Server connected to the internal LAN converts patient signals to digital data and applies measurement algorithms to analyze the signals.

- External measurement devices

 Data can be also acquired from devices connected to interface boards of the monitor. Software modules dedicated to such specific devices convert the data received from an external device to the format used internally. This applies to parameter modules and the Anesthetic Gas Module.

- Server systems on the Philips Clinical Network

 To enable networked applications such as the other bed overview, data can be acquired from server systems attached to the Philips Clinical Network, for example a Philips Information Center

Data Provider System Service

All data that is acquired from measurement servers or external measurement devices is temporarily stored by a dedicated data provider system service. All monitor applications use this central service to access the data in a consistent and synchronized way rather than talking to the interfaces directly.

This service makes the applications independent of the actual type of data acquisition device.

The amount of data stored in the data provider system service varies for the different data types. For example several seconds of wave forms and the full set of current numerical values are temorarily stored in RAM.

Persistent Data Storage System Service

Some applications require storage of data over longer periods of time. They can use the persistent data storage system service. Dependent on the application requirements, this service can store data either in battery backed-up (buffered) memory or in flash memory. The buffered memory will lose its contents if the monitor is without power (not connected to mains) for an extended period of time. The flash memory does not lose its contents.

The trend application for example stores vital signs data in a combination of flash memory and buffered memory, while the system configuration information (profiles) is kept purely in flash memory.

Display and User Interface Service

Applications can use high level commands to display monitoring data or status and command windows on the internal LCD panel. These commands are interpreted by the display manager application. This application controls the dedicated video hardware which includes video memory and a special ASIC.

User input is acquired from a variety of input devices, for example the Navigation Point, the touchscreen or other standard input devices (keyboard, mouse) which may be attached to I/O boards. The system software makes sure that the user input is directed to the application which has the operating focus.

Data Output

The monitoring system is very flexible and customizable regarding its data output devices. Built-in devices (for example LAN, alarm lamps, speaker, video) provide the basic output capabilities.

These capabilities can be enhanced by adding additional I/O boards, as required in the specific end-user setup. The additional I/O boards typically provide data to externally attached devices, for example to printers, RS232 based data collection devices, nurse call systems etc.

The monitor can identify I/O boards by means of a serial EEPROM device that stores type and version information. The operating system detects the I/O boards and automatically connects them with the associated (interface driver) application. For some multi-purpose cards it is necessary to configure the card for a particular purpose first (for example the dual MIB/RS232 card can support external touch display (only slave display), data import, data export).

Monitor Applications

The monitor applications provide additional system functionality over the basic measurement and monitoring capabilities. This includes for example trending, report generating, event storage or derived measurements.

In general, the monitor applications use the data provider system service to access the measurement data. Application interfaces to the other system services allow the application to visualize data, to store data over extended periods of time or to output data to other devices.

Internal LAN (Measurement Server Link)

All components of the monitoring system (including measurement servers and CPUs in the monitor) communicate using an IEEE802.3/ Ethernet LAN in the Measurement Server Link (MSL). This network is used to distribute data between the components, for example:

- Digitized patient signals including wave data, numerical data and status information (typically from the measurement server to a display unit)

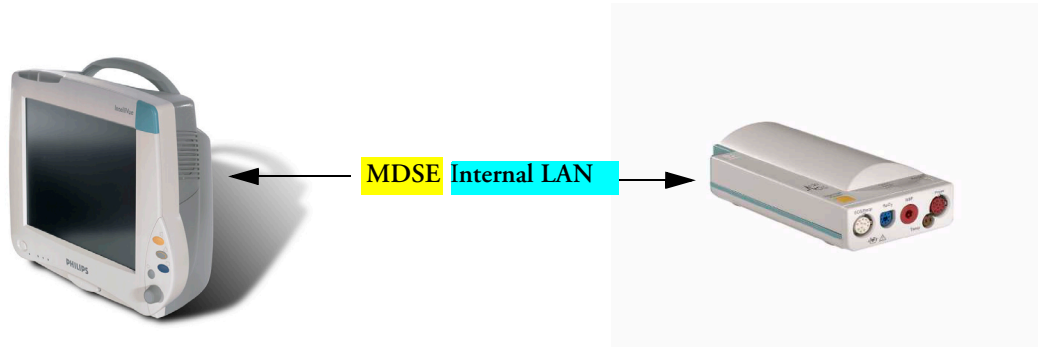
- Control data representing user interactions (typically from the display unit to a measurement server)
- Shared data structures, for example representing patient demographical data and global configuration items

The internal LAN allows plug and play configuration of the monitoring system. The system automatically detects plugging or unplugging of measurement servers and configures the system accordingly.

The components on the internal LAN are time-synchronized to keep signal data consistent in the system. Dedicated hardware support for synchronization eliminates any latency of the network driver software.

The integrated LAN provides deterministic bandwidth allocation/reservation mechanisms so that the real-time characteristic of signal data and control data exchange is guaranteed. This applies to the data flow from the measurement server to the monitor (for example measurement signal data) and the data flow from the monitor to a measurement server (for example to feed data to a recorder module).

Integrated communication hubs in the monitor allow flexible cabling options (star topology, daisy chaining of servers).



Philips Clinical Network

The monitoring system may be connected to the Philips Clinical Network, for example to provide central monitoring capabilities or other network services. This connection may be through a normal wired connection or through a wireless connection.

The monitor supports the connection of an external wireless adapter or an internal wireless adapter (#J35). Switching between wired and wireless networks is automatically triggered by the plugging or unplugging of the network cable.

The Philips Clinical Network protocols function very similarly to the protocols used on the internal LAN.

After configuration, the monitoring system sends the digitized patient signals including wave data, numerical data and status information onto the network. Control data representing user interactions can be exchanged between the monitoring system and a central station bi-directionally.

Additional protocols are supported for networked applications, for example for the other bed overview function, which allows viewing of monitoring data from other patients on the network.

For plug and play operation, the monitoring system uses the standard BootP protocol to automatically acquire a network address.

How does the Support Tool Work with the Monitor

The support tool is a Windows application typically installed on the laptop of a customer engineer or a biomedical engineer working in the customer's own service department.

The purpose of the support tool is to upgrade, configure and diagnose all monitoring components (modules, measurement servers, and monitors) in the system over the network.

The service protocol developed for this purpose uses a raw access to the devices without the need for IP addresses etc. over a standard customer network installation, so that even defective devices can be upgraded as long as the few kBytes of initial boot code are working. The boot code itself can also be upgraded using the same protocol.

The tool allows access to internal service information and to serial numbers. It can be remote-controlled, for example via a dial-up connection from a response center, provided the proper infrastructure is in place.

For details see the Instructions for Use for the Support Tool.

Monitor Software Block Diagram

Figure 8 shows the functional block diagram for the monitoring system. A legend explaining terms and diagram elements follows. The information below varies depending on the purchased monitor options.

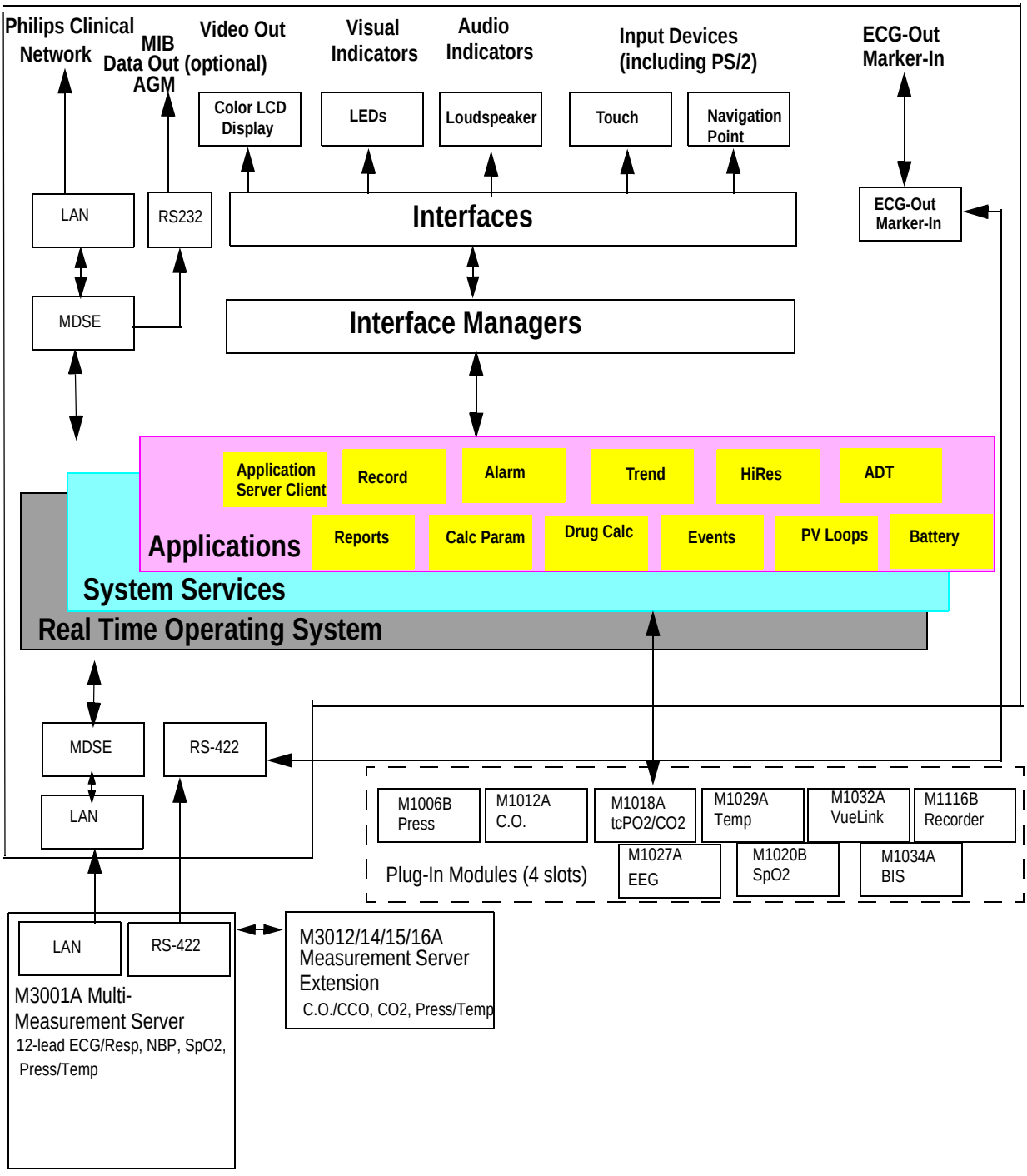


Figure 8 IntelliVue Patient Monitoring System Functional Block Diagram

Block Diagram Legend

Functional Block	Description
Services	
Operating System	The Operating System (OS) provides a layer of isolation between the specific hardware implementation and the application software. The OS performs system checks and allocates resources to ensure safe operation when the system is first started. This includes internal self-tests on several hardware modules and configuration checks for validity of configuration with the operating software. During normal operation, the OS continues to run checks on system integrity. If error conditions are detected the OS will halt monitoring operations and inform the operator about the error condition.
System Services	The System Services provide generic common system services. In particular: They use a real-time clock component to track time. They synchronize to network time sources and verify the accuracy of the system time information. They are also responsible for managing persistent user configuration data for all Measurement Servers, Flexible Module Servers and IntelliVue Patient Monitoring System software modules. User configuration data is stored in a non-volatile read/write storage device
Applications	
Application Server Client	The Application Server Client provides the Citrix[1] thin client functionality.

Functional Block	Description
Reports	The Reports Service retrieves current and stored physiological data and status data to format reports for printing paper documentation. The following reports are supported: • Vital Signs Report • Graphical Trend Report • Event Review Report • Event Episode Report • ECG Report (12 Lead/Multi-Lead) • Cardiac Output Report • Calculations Report (Hemodynamic/Oxygenation/ Ventilation) • Calculations Review Report • Wedge Report • Test Report • Other reports (e.g. Loops, Review Applications, Drug report) The Reports service generates report data which can be printed on a local or a central printer.
Record	The Record Service retrieves current and stored physiological data and status data to format a continuous strip recording. A recording can be triggered manually by the operator or automatically by an alarm condition. The Record Service uses the services of the Recorder Interface to control an M1116B Recorder. The Record Service can also send data to a central recorder.
Alarm	The Alarm Service contains logic that prioritizes alarm conditions that are generated either by the Measurement Servers, Flexible Module Server, or by IntelliVue Patient Monitoring System software modules. Visual alarm signals (messages) are displayed at the top of the IntelliVue Patient Monitoring System display and alarm sounds are generated by a loudspeaker. Alarm conditions may be generated when a physiological parameter exceeds preselected alarm limits or when a physiological parameter or any other software module reports an inoperative status (technical alarm, for example, the ECG leads may have fallen off the patient). The Alarm service manages the alarm inactivation states, for example suspension of alarms, silencing of alarms, and alarm reminder. Alarm signals may also be configured as latching (alarm signals are issued until they are acknowledged by the operator, even when the alarm condition is no longer true). The Alarm service controls the visual alarm signals (alarm lamps).

Functional Block	Description
Trend	The Trend service stores the sample values of physiological data and status data with a resolution of 12 seconds, 1 minute or 5 minutes for a period of up to 48 hours. The data is kept in battery buffered read/write storage and flash memory devices to be preserved across power failures. The stored data is protected via consistency checks and checksums. When a new patient is admitted, the trend database erases all data of the previous patient.
HiRes	The OxyCRG (Oxygen CardioRespiroGram) service derives a high-resolution trend graph from the Beat-to-Beat Heart Rate, SpO_2 or $tcpO_2$, and Respiration physiological data. The OxyCRG is specialized for neonatal applications, allowing the operator to identify sudden drops in Heart Rate (Bradycardia) and SpO_2 or $tcpO_2$ (Desaturations), and supporting the operator in visualizing Apnea situations.
ADT	The ADT (Admit/Discharge/Transmit) service maintains the patient demographics information. The operator may admit a new patient, discharge the old patient and enter or modify the patient demographics. The ADT service also supports the transport of a patient (trend database) with the M3001A Multi-Measurement Server. The ADT service controls the deletion of old patient data, the upload of trend data from the M3001A and the switching back of all settings to user defaults. It also synchronizes patient information with a central station on the network.
Calc Param	The Calc Param (Calculated Parameters) service accesses current, stored and manually entered physiological data as input to calculation formulas. With these formulas, derived hemodynamic, oxygenation and ventilation variables are computed. The calculation results, including the input parameters, are stored for later review using the Trend service.
Drug Calc	The Drug Calc application aids in calculating drug dosages for patients.
PV Loops	The PV Loops application compares graphic representations of airway waves to help detect changes in the patient airway condition.
Battery	Provides battery operation of the monitor.
Interface Managers	
MDSE	The MDSE (Medical Data Service Element) Interface Manager is responsible for the exchange of real-time data between the IntelliVue Patient Monitoring System display unit and the Measurement Servers and Flexible Module Server as well as between the IntelliVue Patient Monitoring System display unit and other devices attached to the network. MDSE establishes and maintains a data communication link between the devices. It provides configuration information about the remote device to applications in the local device and it allows the exchange of measurement data and status information between the devices.

Functional Block	Description
Printer	The Printer Interface Manager provides a high level interface to a printer. It provides means to: • establish a connection to the printer • transfer data to the printer • get status of the printer • close connection to the printer The Printer Interface Manager also supervises the connection to the printer and whether the printer accepts data (for example paper out). The Printer Interface Manager notifies the operator in such cases.
Display & Operator Interface	The Display and Operator Interface Manager performs the following tasks: • Screen presentation of real-time and stored physiological measurement data, alarm condition data and status information received from the MDSE interface manager, the Alarm service or other IntelliVue Patient Monitoring System modules • Screen presentation of operating controls (control windows) • Processing of operating control commands received from HIF Control interface. The module verifies and interprets the received commands and forwards them to other software modules of the IntelliVue Patient Monitoring System display unit, Measurement Servers or Flexible Module Server • Sound generation (issues audible alarm signals and generates audible information signals, for example QRS and SpO_2 tones, operator audible feedback)
Interfaces	
LAN	The LAN interface implements the physical layer of IEEE 802.3. The LAN interface performs Manchester encoding/decoding, receive clock recovery, transmit pulse shaping, jabber, link integrity testing, reverse polarity detection/correction, electrical isolation, and ESD protection. Electronically separated interfaces are used for communication to the Measurement Servers or Flexible Module Server and to the network.
Centronics	The Centronics interface implements the standard signaling method for bi-directional parallel peripheral devices according to IEEE 1284-I. The interface is used as a parallel interface to a standard printer with electrical isolation and ESD protection.

Functional Block	Description
Display Controller	The Display Controller Interface consists of a video controller chip, video RAM and the controlling software. The Display Controller interface processes the high level display commands (character and graphic generation, wave drawing) and translates them into pixels, which are written into the video RAM where the video controller chip generates the video synchronization signals and the pixel stream for the Color LCD Display.
HIF Control	The HIF (Human Interface Control) interface scans the Human Interface devices for operator controls (Touch Screen, Speed Point, and PS/2 devices), formats the collected data and sends it to the display and Operating Interface.
ECG-Out Marker-In	The ECG Out/Marker In interface receives the ECG waveform directly from the ECG/Resp Arrhythmia ST-Segment physiological algorithm via an RS-422 serial interface and converts the digital ECG signal to an analog ECG signal. In addition, the ECG Out controller receives from a connected device the marker information and forwards this data to the ECG/Resp Arrhythmia ST-Segment physiological algorithm. The converted analog signal is used to synchronize a connected device to the patient's ECG
RS-422	The serial link RS-422 interface communicates the ECG signal to the ECG Output/Marker In of the IntelliVue Patient Monitoring System display unit. The interface is a serial, differential, full-duplex link. The interface is ESD protected.
PS/2	The PS/2 interface supports the serial protocol of standard PS/2 devices (mouse). The PS/2 serial protocol is interpreted by the HIF Control interface.
Nurse Call	The Nurse Call board contains 2 connectors. A phone jack type connector and a multi-port connector. The phone jack type connector has a single close-on-alarm relay. The multi-port connector has three alarm relays which are configurable to be open or closed on alarm. In addition, this interface has an audible alert capability for loss of AC power.
MIB	The MIB interface allows full-duplex, short-haul asynchronous binary communication between the monitor and an arbitrary (medical/non-medical) device using an eight-pin RJ45 modular connector. Switching between MIB and RS232 protocol is possible.
Docking Interface	The docking interface provides necessary connections for docking an MP20/30 or MP40/50 monitor onto the docking station.
IIT Interface	The IIT interface allows operation of the MP20/30/40/50 monitors with IntelliVue Instrument Telemetry.

1.Citrix® is a registered trademark of Citrix Systems, Inc.

3

Testing and Maintenance

Concepts

This chapter provides a checklist of the testing and maintenance procedures for the monitor, the MMS, the Measurement Server Extensions and the modules.

Preventive Maintenance refers specifically to the series of tests required to make sure the measurement results are accurate. The measurements requiring these reported tests are NBP and Microstream CO_2. The accuracy and performance procedures are designed to be completed as specified in the following sections or when readings are in question.

Test Reporting

Authorized Philips personnel report test results back to Philips to add to the product development database. Hospital personnel, however, do not need to report results. This table shows you what to record on the service record after completing the tests in this chapter.

Test	**What to record**
Visual	V:P or V:F
Power On	PO:P or PO:F
P NIBP	PN:P/X1/X2/X3/X4 or PN:F/X1/X2/X3/X4
P CO_2	PCO2:P/X1/X2/X3/X4/X5/X6/X7/X8 or PCO2:F/X1/X2/X3/X4/X5/X6/X7/X8
Safety	S(1):P/x1/x2 or S(1):F/x1/x2 S(2): P/x1 or S(2): F/x1 S(3): P/x1 or S(3): F/x1

Where P = Pass, F = Fail and X/x are the measured values as defined in the tests described in this chapter.

Frequency

The testing checklist appears in the next section of this chapter. Perform the procedures as indicated in the suggested testing timetable. These timetable recommendations do not supersede local requirements.

Suggested Testing Timetable	**Frequency**
Preventive Maintenance Tests • NBP Calibration • Microstream CO_2 Calibration • CO_2 pump / CO_2 scrubber replacement	Required • Once every two years, or more often if specified by local laws. • Once a year or after 4,000 hours continuous use and following any instrument repairs or the replacement of any instrument parts. • Once every three years or after 15 000 operating hours
Performance Tests • Temperature Accuracy • ECG/Resp Performance • Invasive Pressure Performance • SpO_2 Performance • Mainstream CO_2 Accuracy Check • Sidestream CO_2 Accuracy Check and Flow Check • Spirometry Accuracy Test • EEG Performance • C.O. Performance • BIS Performance • SvO2 Performance • tcGas Performance • VueLink Performance • Nurse Call Relay Performance* • ECG Sync Performance* *Only when in use as part of hospital protocols	Required: Once every two years, or if you suspect the measurement is incorrect, except Mainstream CO_2 Accuracy Check and Sidestream CO_2 Accuracy Check and Flow Check- required once a year.
Safety Tests (in accordance with IEC 60601-1) • System Enclosure Leakage Current • Protective Earth • Patient Leakage Current	Required: Once every two years and after repairs where the unit has been opened (front and back separated) or the monitor has been damaged by impact.

Tests When Performing...

Installation

Service Event (When performing...)	Test Blocks Required ...Complete these tests)
Installation of monitor with **no** display connected to the VGA output	Perform Visual and Power On Test Blocks
Installation of monitor with a display connected to the video output	Perform Visual, Power On and Safety (1) Test Blocks
Installation of monitor with IntelliVue Instrument Telemetry (IIT)	Perform Power On and Safety Test Blocks and IIT communication test
Installation of monitor with IntelliVue 802.11 Bedside Adapter	Perform Power On and Safety Test Blocks and IntelliVue 802.11 Bedside Adapter Communication Test
Installation of a monitor with Docking Station	Perform Docking Station Performance Tests and Safety Test Blocks. (Monitor must be on Docking Station).

Repair

Service Event (When performing...	Test Blocks Required ...Complete these tests)
Repairs of M3015A	Perform Power On and M3015A tests
Repairs where the monitor has been damaged by impact	Perform Power On and Safety (2) and (3) Test Blocks
Repairs where the unit has been opened (front and back separated)	Perform Power On and Safety (2) Test Block
All other IntelliVue Monitoring System repairs	Perform Power On Test Block
Repairs of IntelliVue Instrument Telemetry (IIT) Module	Perform Power on and Safety Test Blocks and IIT communication test
Repairs of the Docking Station	Perform Docking Station Performance Tests and Safety Test Blocks. Monitor must be on Docking Station.

Preventive Maintenance

Perform preventive maintenance tests and procedures:

- NBP calibration

- Microstream CO_2 calibration
- Pump and scrubber replacement.

Performance Verification

Perform all safety, accuracy and performance test procedures listed in the following sections. If a particular measurement is in question, perform the measurement performance test only.

Upgrades

Service Event **(When performing...**	**Test Blocks Required** **...Complete these tests)**
Software upgrades	Perform Power On Test Block unless otherwise specified in the Upgrade Installation Notes shipped with the upgrade.
Hardware Upgrades where the unit is NOT opened up (i.e. System Interface and I/O board upgrades)	Perform Power On Test Block unless otherwise specified in the Upgrade Installation Notes shipped with the upgrade.
Hardware Upgrades where the unit is opened up	Perform Power On Test Block and Safety (2) test Block
Hardware Upgrades where IntelliVue Instrument Telemetry (IIT) is installed	Perform Power On and Safety Test Blocks and IIT communication Test
Hardware Upgrades where IntelliVue 802.11 Bedside Adapter is installed	Perform Power On and Safety Test Blocks and IntelliVue 802.11 Bedside Adapter Communication Test

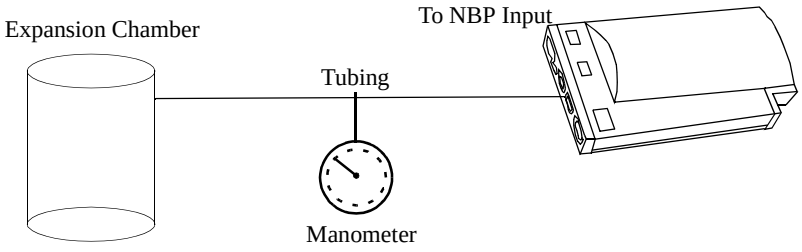
Preventive Maintenance Procedures

NBP PerformanceTests

This section describes NBP test procedures.The monitor must be in service mode and the screen “Service A” must be selected to perform these tests.

NBP Accuracy Test

This test checks the performance of the non-invasive blood pressure measurement. Connect the equipment as shown:



Tools required:

- Reference manometer (includes hand pump and valve), accuracy 0.2% of reading.
- Expansion chamber (volume 250 ml +/- 10%)
- Appropriate tubing.

In service mode, the systolic and diastolic readings indicate the noise of NBP channels 1 and 2 respectively. When static pressure is applied, the reading in NBP channel 1 should be below 50. The value in parentheses indicates the actual pressure applied to the system.

1 Connect the manometer and the pump with tubing to the NBP connector on the MMS and to the expansion chamber.

2 In service mode, select the **`Setup NBP`** menu.

3 Select **`Close Valves: On`**

4 Raise the pressure to 280 mmHg with the manometer pump.

5 Wait 10 seconds for the measurement to stabilize.

6 Compare the manometer values with the displayed values.

7 Document the value displayed by the monitor (x1).

8 If the difference between the manometer and displayed values is greater than 3 mmHg, calibrate the MMS. If not, proceed to the leakage test.

9 To calibrate the MMS, select **`Close Valves off`** then **`Calibrate NBP`** and wait for the instrument to pump up the expansion chamber.Wait a few seconds after pumping stops until **`EnterPrVal`** is highlighted and then move the cursor to the value shown on the manometer. If one of the following prompt messages appears during this step, check whether there is leakage in the setup:

 – NBP unable to calibrate–cannot adjust pressure

 – NBP unable to calibrate–unstable signal

10 Press **`Confirm`**.

If the INOP NBP Equipment Malfunction message occurs in monitoring mode, go back to service mode and repeat the calibration procedure.

NBP Leakage Test

The NBP leakage test checks the integrity of the system and of the valve. It is required once every two years and when you repair the monitor or replace parts.

1 If you have calibrated, repeat steps 2 to 6 from the accuracy test procedure so that you have 280 mmHg pressure on the expansion chamber.

2 Watch the pressure value for 60 seconds.

3 Calculate and document the leakage test value (x2).
x2 = P1 - P2
where P1 is the pressure at the beginning of the leakage test and P2 is the pressure displayed after 60 seconds.
The leakage test value should be less than 6 mmHg.

NBP Linearity Test

1 Reduce the manometer pressure to 150 mmHg.

2 Wait 10 seconds for the measurement to stabilize.

3 After these 10 seconds, compare the manometer value with the displayed value.

4 Document the value displayed by the monitor (x3)

5 If the difference is greater than 3 mmHg, calibrate the MMS (see steps 9 to 10 in the accuracy test procedure).

Valve Test

1 Raise the pressure again to 280 mmHg.

2 Select `Close valves: Off`.

3 Wait five seconds and then document the value displayed. The value should be less than 10 mmHg.

4 Document the value displayed by the monitor (x4).

Test	Expected test results
Accuracy test	x1 = value displayed by monitor Difference ≤ 3mmHg
Leakage test	x2 = leakage test value x2 < 6 mmHg
Linearity test	x3 = value displayed by monitor Difference ≤ 3mmHg
Valve Test	x4 = value < 10 mmHg

Microstream CO_2 Performance Test

Allow five seconds between individual service procedures to ensure stable equipment conditions. When certain monitor procedures are running, service procedures are not possible and trying to start them will result in a message **`Service Operation Failed`** in the monitor's status line. Wait until the monitor completes the current operation, then restart the service procedure.

This test checks the performance of the CO_2 measurement for the Microstream extension. The CO_2 performance test is required once per year and when the instrument is repaired or when parts are replaced.

This test uses calibration equipment that you can order (see the *Parts* section for the part number). The procedure is summarized in the following steps. Refer to the documentation accompanying the equipment for detailed instructions.

Tools Required:

- Standard tools, such as screwdriver, tweezers
- Electronic flowmeter, M1026-60144
- Gas calibration equipment:
- Cal 1 gas 15210-64010 (5% CO_2)
- Cal 2 gas 15210-64020 (10% CO_2)
- Cal gas flow regulator M2267A
- Cal tube 13907A

You also need a local barometric pressure rating received from a reliable local source (airport, regional weather station or hospital weather station) which is located at the same altitude as the hospital.

The CO_2 calibration for the Microstream extension consists of the following steps:

- Barometric pressure check and calibration, if required.
- Leakage check
- Pump check
- Flow check and calibration, if required
- Noise check
- CO_2 Cal check and calibration, if required
- CO_2 Cal verification using 2nd cal gas

Perform all checks in the same session.

Barometric Pressure Check and Calibration

Check the barometric pressure value in the Microstream CO_2 extension as follows:

1 Go into service mode and select **`Setup CO2`** menu.

2 Connect a FilterLine to the Microstream CO_2 input. This activates the pump in the Microstream CO_2 Extension.

3 The status line at the bottom of the screen displays "CO2 pressure reading (ambient/cell) xxx/yyy" where xxx is the ambient pressure and yyy is the measured cell pressure. Check whether the ambient pressure value (x1) matches (within the acceptable tolerance of ±12mm Hg) the reference

value you have received. If so, proceed to the leakage check. If the value is not correct, calibrate as follows.

a. Select **CO_2** then select **Barom.Press** to activate a table of values.

b. Select the value in the table which matches the reference value received from a reliable local source (airport, regional weather station or hospital weather station). (The values are displayed with a resolution of 2 mmHg up to 500 mmHg and a resolution of 1 mmHg from 500 mmHg to 825 mmHg.) Note: the selected value must be within ±10% of the current measured ambient pressure, otherwise an error message will occur at restarting the monitor.

c. Confirm the barometric pressure setting.

d. Check that the ambient pressure displayed in the status line at the bottom of the screen is the same as the value which you selected from the list in step b.

Leakage Check

The leakage check consists of checking the tubing between:

- the pump outlet and the measurement server extension outlet and
- the pump inlet and FilterLine inlet.

Check the user's guide of the flowmeter for details on how to make a correct flow reading.

Part 1

1 Go into service mode and select **Setup CO_2** menu.

2 Connect a FilterLine to the Microstream CO_2 input to start the pump running.

3 Check the ambient pressure and the cell pressure shown in the monitor's status line. The cell pressure should be approximately 20 mmHg lower than ambient pressure.

4 Connect the flowmeter outlet to the FilterLine inlet using a flexible connecting tube.

5 Block the measurement server extension outlet using your fingertip and observe the flowmeter display. The value on the flowmeter (x2) should decrease to between 0 and 4 ml/min, accompanied by an audible increase in pump noise. If the value is within the tolerance limits, continue with part 2 of the leakage check.

6 If the value is outside the tolerance limits, there is a leakage between the pump outlet and the measurement server extension gas outlet.

7 Open the measurement server extension and check the tubing connections at the pump outlet and the extension gas outlet. If the connections are good, then there is a leakage in the tubing and you must exchange the measurement server extension.

Part 2

1 Disconnect the flowmeter from the Part 1 setup and connect the flowmeter inlet to the M3015A gas outlet.

2 Leave the Filterline connected to the M3015A inlet.

3 Block the inlet of the FilterLine using your fingertip and observe the flowmeter display. The value on the flowmeter (x3) should decrease to between 0 and 4 ml/min, accompanied by an audible increase in pump noise. The cell pressure shown in the status line on the display should decrease to between 300 and 500 mmHg. Do not block the inlet for longer than 25 seconds as this will lead to

an “Occlusion” INOP. If the value is within the tolerance limits, there are no leakages and the leakage check is completed; proceed to the pump check.

4 If the value is not within the tolerance limits, there is a leakage between the FilterLine inlet and the pump inlet.

5 Check the FilterLine connections and open the M3015A to check the tubing connections at the pump inlet and the M3015A gas inlet. If the connections are good, try replacing the FilterLine and repeating the leakage check. If the situation remains, there is a leakage in the tubing and the M3015A must be exchanged.

Pump Check

1 Connect the flowmeter inlet to the M3015A gas outlet.

2 Connect the FilterLine to the M3015A inlet.

3 Block the inlet of the FilterLine using your fingertip and observe the cell pressure on the M3046A display. The cell pressure (x4) should be more than 120 mmHg below the ambient pressure shown. If the pressure difference is less than 120 mmHg, the pump is not strong enough and you should replace it, irrespective of the Pump OpTime.

Flow Rate Check and Calibration

Check the flow rate in the Microstream CO_2 extension as follows:

1 Connect the flowmeter to the CO_2 FilterLine.

2 Check on the flowmeter the flow that the Microstream CO_2 extension pump draws (x5). It should be 50 ml/min ± 7.5 ml/min. If the value is within tolerance, proceed to the CO_2 Gas calibration check. If the value is not within tolerance, calibrate as follows.

3 Adjust the flow in the instrument by selecting **`Increase Flow`** or **`Decrease Flow`** until it is as close as possible to 50 ml per minute as indicated on the flowmeter gauge.

4 When you are satisfied that the flow is set as close as possible to 50 ml per minute, select **`Store Flow`** and confirm the setting. If you do not store the adjusted flow within 60 seconds of the adjustment, the old flow setting is restored.

5 If you cannot adjust the flow to within tolerance, replace the pump. If you still cannot make the flow adjustment, this indicates a fault in the measurement extension, which must be replaced.

Noise Check

1 With the monitor in service mode, select **`Setup CO2`** menu.

2 Disconnect the flowmeter and connect the 5% calibration gas and flow regulator in its place.

3 Open the valve to apply the 5% calibration gas and wait until the value is stable.

4 Check the noise index (x6) displayed next to the CO_2 value on the display (this indicates the level of noise on the CO_2 wave). If the value exceeds 3 mmHg, replace the measurement extension.

CO_2 Gas Measurement Calibration Check

After switching the measurement extension on, wait at least 20 minutes before checking the calibration. Check the calibration of the CO_2 gas measurement as follows:

1 Check that the 5% calibration gas and flow regulator are connected.

2 Calculate the expected measurement value in mmHg as follows:

0.05 x (ambient pressure) = value mmHg
for example 0.05 x 736 = 36.8 mmHg (with an ambient pressure of 736 mmHg)

3 Open the valve on the flow regulator to allow 5% CO_2 gas to flow into the extension. Allow the value to stabilize.

4 Check that the value on the instrument (measurement value on the main screen, x7) matches the calculated mmHg value ± 2.6 mmHg. If the value is outside the tolerance, calibrate as described in step 9 in this procedure onwards.

5 Disconnect the 5% calibration gas and connect the 10% calibration gas.

6 Calculate the expected measurement value and tolerance in mmHg as follows:

0.1 x (ambient pressure) = value mmHg
±0.07 x (value mmHg) = tolerance

for example 0.1 x 737 mmHg = 73.7 mmHg (with an ambient pressure of 737 mmHg)
±0.07 x 73.7 mmHg = ±5.16 mmHg tolerance

7 Open the valve on the flow regulator to allow 10% CO_2 gas to flow into the extension. Allow the value to stabilize.

8 Check that the value on the instrument (x8) matches the calculated mmHg value within the calculated tolerance. If so, the measurement extension is correctly calibrated. If the value is outside the tolerance, calibrate as follows.

9 If not already connected, connect the 5% calibration gas.

10 Select **`Cal. CO2`**.

11 Select the value for the calibration gas. (The default value is 5.0%.)

12 Open the valve on the calibration gas to allow CO_2 gas to flow into the extension. Allow the value to stabilize before the start of the calibration. Leave the valve open until the instrument gives a prompt that gas can be removed.

13 The extension calibrates and prompts when calibration is successful.

Calibration Verification

1 Reopen the 5% gas valve and allow the value to stabilize.

2 Check that the value displayed on the monitor is correct within the tolerance (see step 2 above).

3 Disconnect the 5% calibration gas and connect the 10% calibration gas.

4 Open the valve on the flow regulator to allow 10% CO_2 gas to flow into the extension. Allow the value to stabilize.

5 Check that the value displayed on the monitor is correct within the tolerance (see step 6 above).

If one or both values are not within tolerances, you must exchange the measurement server extension.

Reset Time Counters

You must check the time counters on the Microstream CO_2 extension before calibrating the instrument. As well, when parts are replaced, the appropriate counters must be reset to zero.

The counters for CO_2 pump, IR Src and Last Cal are displayed in the status line. The values are updated when entering the **Setup CO_2** menu.

Observe the following guidelines:

- When calibrating the CO_2 extension, if no parts have been replaced, check the displayed values of **Reset PumpOpTime** and **Reset IRSourceTime** selections to make sure that they are within suggested guidelines for use (15, 000 hours of continuous use). If the counter time is greater than 15, 000 hours, replace the appropriate part. See *Repair and Disassembly* for details.
- When calibrating the CO_2 extension, if parts have been replaced, reset the appropriate values using the **Reset PumpOpTime** and **Reset IRSourceTime** selections. See *Repair and Disassembly* for details.

Resetting the PumpOpTime generates the INOP: "CO_2 OCCLUSION". To clear this INOP you must perform a flow check and store the flow in service mode (select **Store Flow**).

Test	Expected Test Results
Barometric Pressure Check	x1 = difference between the reference pressure and the measured ambient pressure displayed on the monitor (x1<12 mmHg)
Leakage Check parts 1 and 2	x2 = value of part 1 leakage check on flowmeter (x2< 4.0 ml/min) x3 = value of part 2 leakage check on flowmeter (x3< 4.0 ml/min)
Pump Check	x4 = difference in pressure between cell pressure and ambient pressure displayed on the monitor during occlusion (x4 >120 mmHg)
Flow Check	x5 = difference between measured value and 50.0 ml/min (x5<7.5 ml/min)
Noise Check	x6 = noise index displayed on monitor (x6<3.0)
CO_2 Gas Calibration Check	x7 = difference between measured CO_2 value and calculated value, based on 5% CO_2 cal. gas. (x7 < 2.6 mmHg)
CO_2 Cal Verification	x8 = difference between measured CO_2 value and calculated value, based on 10% CO_2 cal. gas. (x8 < ± {0.07 x value calculated})

CO_2Pump / CO_2 Scrubber Replacement

Refer to the Repair and Disassembly section for the replacement procedures.

M3014A Capnography Extension Performance Tests

The procedures below describe the mainstream and sidestream CO_2 performance tests for the M3014A Capnography Extension.

Mainstream CO_2 Accuracy Check

Tools Required:

- three airway adapters
- Verification Gas M2506A
- Gas cylinder regulator M2505A

You also need a local barometric pressure rating received from a reliable local source (airport, regional weather station or hospital weather station) which is located at the same altitude as the hospital.

Procedure

1. Attach the M2501A CO_2 sensor to the patient monitor. Attach an airway adapter to the sensor. Make sure that the sensor is disconnected from the patient circuit.
2. Switch on the patient monitor.
3. Enter the monitor's Service Mode.
4. Using the sensor status provided in the M2501A Serial protocol, wait for the M2501A sensor to warm up to its operating temperature.
5. The default setting for gas temperature is 22°C. If the gas temperature is significantly above or below this value, correct the gas temperature setting.
6. Zero the sensor on the airway adapter being used in this test. Ensure Zero Gas is set to Room Air
7. Attach a regulated flowing gas mixture of 5% CO_2, balance N_2 to the airway adapter.
8. Set the gas correction to off.
9. Allow a few seconds for the gas mixture to stabilize and observe the CO_2 value. The expected value is 5% of the ambient pressure ±2mmHg

NOTE Make sure that you follow the above steps correctly. If the sensor fails this check it must be exchanged. The sensor cannot be calibrated

Sidestream CO_2 Accuracy Check

Tools Required:

- Cal gas flow regulator M2267A
- Cal tube 13907A
- Verification Gas M2506A
- Straight Sample Line M2776A

You also need a local barometric pressure rating received from a reliable local source (airport, regional weather station or hospital weather station) which is located at the same altitude as the hospital.

Procedure

1. Attach the M2741A CO_2 sensor to the patient monitor. Attach the sample line and the cal tube to the sensor. Make sure that the sensor is disconnected from the patient circuit.
2. Switch on the patient monitor.

3 Enter the monitor's Service Mode.

4 Using the sensor status provided in the M2741A Serial protocol, wait for the M2741A sensor to warm up to its operating temperature.

5 Zero the sensor. Ensure Zero Gas is set to Room Air

6 Attach a regulated flowing gas mixture of 5% CO_2, balance N_2 to the cal tube.

7 Set the gas correction to off.

8 Allow a few seconds for the gas mixture to stabilize and observe the CO_2 value. The expected value is 5% of the ambient pressure ±2mmHg

NOTE Make sure that you follow the above steps correctly. If the sensor fails this check it must be exchanged. The sensor cannot be calibrated

Sidestream CO_2 Flow Check

Check the flow rate in the Sidestream CO2 extension as follows:

1 Connect the flowmeter to the sample line

2 Check on the flowmeter the flow that the Sidestream CO_2 extension pump draws. It should be 50 ml/min ± 10 ml/min. If the value is not within tolerance check your setup again and perform another flow check. If it fails again, the sensor must be replaced. The sensor cannot be calibrated.

Spirometry Performance Tests

These tests verify the performance accuracy of the M1014A Spirometry module.

Equipment Required

- Leak test kit (Part number: M1014-64100)
- calibrated barometer
- M2785A Pediatric/Adult Flow Sensor
- 500ml calibration syringe, Hans Rudolph model 5550 or equivalent

Flow Test

1 Connect the M1014A Spirometry Module to the host monitor and go into service mode.

2 Connect the flow sensor to the module.

3 Connect the 500ml calibration syringe to the flow sensor. Make sure the syringe is set to the "empty" position.

4 Press the **Setup** key on the module and select **Show all Values** in the **Setup Spirometry** menu.

5 Pump the calibration syringe back and forth with a steady motion at a rate of 20 cycles and verify that the readings for TVexp and TVin are 500 ± 25 ml.

If the readings are not within the specified range, try another flow sesor. Ensure that the syringe is calibrated correctly and that the procedure is performed exactly as described above. If the test fails again, replace the module.

Leakage Test

1 Connect the M1014A Spirometry Module to the host monitor and go into service mode.

2 Connect the leak test adapter to the module.

3 Press the **Setup** key on the module and then select **Show all Values** in the **Setup Spirometry** menu.

4 Press the Purge key on the module and start a purge cycle. At the end of the purge cycle, the values for Paw and Ppeak should both be above 100 cmH2O.

5 Verify that the pressure difference between Ppeak and Paw remains less than 10 cmH2O after 30 seconds.

If the readings are not within the specified range or if an INOP (e.g. SPIRO PURGE FAILED) is issued, check the leak test adapter for any leaks. Disconnect the adapter from the module and start the test procedure from the beginning. If the test fails again, replace the module.

Barometer Check

1 Connect the M1014A Spirometry Module to the host monitor and go into service mode.

2 Attach any airway adapter to the module.

3 Press the Setup key on the module and then select **Show all Values** in the **Setup Spirometry** menu.

4 Check that the barometric reading (PB) is within ± 5 mmHg of a reference barometer.

5 If the readings are not within the specified range, check the accuracy of the barometric pressure reference again. If the test fails again, replace the module.

NOTE The built-in barometer cannot be recalibrated.

Tests

Some of the following test procedures must be performed in service mode. To enter service mode select **Operating Modes** in the main menu. Then select **Service Mode** and enter the password.

If required, open the screen menu in the monitor info line at the top of the screen and select **Service** to access the service screen. This is required particularly for Anesthetic Gas Module testing procedures.

Visual Test

Inspect the system for obvious signs of damage. Also check all external leads and accessories.

The expected test result is pass: the system has no obvious signs of damage.

Power On Test

1 Switch on the monitor and connect the MMS.

2 Make sure that all steps listed in the table *Initial Instrument Boot Phase* in the Troubleshooting section are completed successfully and that an ECG wave appears on the screen.

The expected test result is pass: the monitor boots up and displays an ECG wave. The wave might be a flat line if no simulator is attached.

Temperature Performance Test

This test checks the performance of the temperature measurement.

Tools required: Patient simulator (with 0.1°C or 0.2°F).

1 Connect the patient simulator to the temperature connector on the MMS or measurement server extension.

2 Configure the patient simulator to 40 °C or 100 °F.

3 The value should be 40 °C ± 0.2 °C or 100 °F ± 0.4 °F.

ECG/Resp Performance Test

This test checks the performance of the ECG and respiration measurements.

Tools required: Patient simulator.

ECG Performance

1 Connect the patient simulator to the ECG/Resp connector on the measurement server.

2 Configure the patient simulator as follows:

– ECG sinus rhythm.

– HR = 100 bpm.

3 Check the displayed ECG wave and HR value against the simulator configuration.

4 The value should be 100bpm +/- 2bpm.

Respiration Performance

1 Change the Patient Simulator configuration to:

– Base impedance line 1500 Ohm.

– Delta impedance 0.5 Ohm.

– Respiration rate 40 rpm.

2 The value should be 40 rpm +/- 2 rpm.

Invasive Pressure Performance Test

This test checks the performance of the invasive pressure measurement.

Tools required: Patient simulator.

1 Connect the patient simulator to the pressure connector on the MMS or the measurement server extension.

2 Set the patient simulator to 0 pressure.

3 Make a zero calibration.

4 Configure the patient simulator as P(static) = 200 mmHg.

5 Wait for the display.

6 The value should be 200 mmHg ± 5 mmHg. If the value is outside these tolerances, calibrate the MMS or measurement server extension. If the MMS was calibrated with a dedicated reusable catheter, check the calibration together with this catheter.

SpO_2 Performance Test

This test checks the performance of the SpO_2 measurement.

Tools required: none

1 Connect an adult SpO_2 transducer to the SpO_2 connector on the MMS.

2 Measure the SpO_2 value on your finger (this assumes that you are healthy).

3 The value should be between 95% and 100%.

Measurement Validation

The SpO_2 accuracy has been validated in human studies against arterial blood sample reference measured with a CO-oximeter. In a controlled desaturation study, healthy adult volunteers with saturation levels between 70% and 100% SaO_2 were studied. The population characteristics for those studies were:

- about 50% female and 50% male subjects
- age range: 18 to 45
- skin tone: from light to black

NOTE A functional tester cannot be used to assess the accuracy of a pulse oximeter monitor. However, it can be used to demonstrate that a particular pulse oximeter monitor reproduces a calibration curve that has been independently demonstrated to fulfill a particular accuracy specification.

Cardiac Output Performance Test

These tests check the performance of the cardiac output measurement.

1 Connect the patient simulator to the C.O. module using the patient cable.

2 Configure the patient simulator as follows:
Injection temperature: 2 °C
Computation Const: 0.542
(Edward's Catheter)
Flow: 5 l/min

3 Check displayed value against the simulator configuration.

4 Expected test result: C.O. = 5 +/– 1 l/min.

Service Tool Procedure, Version 1

This procedure applies for Service Tool M1012-61601 in combination with C.O. modules without option C10 and M3012A MMS extensions with option C05.

1 In monitoring mode, connect the C.O. interface cable to the module.

2 Connect one side of the service tool to the injectate receptacle of C.O. interface cable and the other side to catheter cable receptacle.

3 Enter the **`C.O. Procedure`** window and check the results. The expected test result is:

– Tblood = 37.0°C +/- 0.1°C

Service Tool Procedure, Version 2

This procedure applies only for Service Tool M1012-61601 in combination with C.O. modules with option C10 and for the M3012A MMS Extension with option C10.

1 In monitoring mode, connect the C.O. interface cable to the module.

2 Connect one side of the service tool to the injectate receptacle of the C.O. interface cable and the other side to the catheter cable receptacle.

3 Enter **C.O. Procedure** window and check results for:

– Method of measurement

– Arterial Catheter constant

– Tblood

The expected results are:

– Transpulmonary

– 341

– Tblood = 37.0°C +/- 0.1°C

4 Make sure the main alarms are switched on.

5 Disconnect the Catheter cable receptacle from the service tool

6 Enter the Setup C.O Window and change the method of measurement to “Right Heart”

7 Enter the C.O. Procedure window and check the Tinj value. The expected result is:

– Tinj = 0.0°C +/- 0.1°C

BIS Performance Test

These tests check the performance of the BIS measurement.

PIC/DSC Test

1 In monitoring mode connect the sensor simulator (for maximum usage please refer to the documentation delivered with the sensor simulator) to the patient interface cable.

2 Enter the BIS menu and select **Show Sensor**.

3 Start impedance check by pressing **StartCyclicCheck**. Check the displayed results. Expected results are:

– Electrode 1 (+): 4-6 kΩ

– Electrode 2 (Ref): 8-12 kΩ

– Electrode 3 (1-): 1-3 kΩ

– Electrode 4 (2-): 1-3 kΩ

Nurse Call Relay Performance Test

The nurse call relay performance test can be performed either at the phone jack type connector (this only tests one relay) or at the multi-port nurse call connector (to test all three relays).

Phone Jack Type Connector Test (Traditional Nurse Call)

This test checks the operation of the traditional Nurse Call Relay. The Nurse Call Relay test is recommended for customer sites where the nurse call is in use. The Nurse Call relay functions as follows:

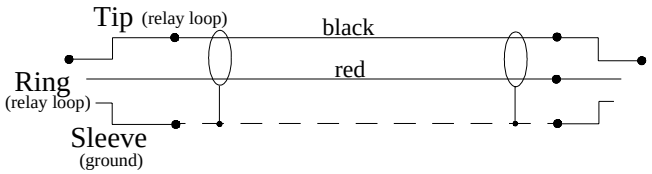
- Standard Operation—Relay open.
- Alarm Condition—Relay closed.

Tools required: Ohmmeter.

1 Plug a phono connector into the Nurse Call Relay connector.

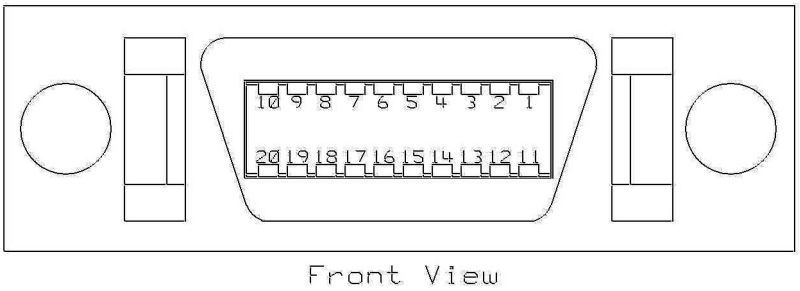
2 Connect the ohmmeter.

3 If no alarm occurs, the relay contacts are open. When an alarm occurs, the relay contacts close.



Multi-Port Nurse Call Connector Test (Flexible Nurse Call)

This test checks the operation of the Flexible Nurse Call Relay. The Nurse Call Relay test is recommended for customer sites where the nurse call is in use. The following diagram and table show the pins and relay identifiers of the connector:



Pin	Cable Color Coding	Relay
1	black	R2-closure
2	brown	R2-middle
3	red	R2-opener

Pin	Cable Color Coding	Relay
4	orange	R3-closure
5	yellow	R3-middle
6	green	R3-opener
7	blue	n/a
8	purple	n/a
9	gray	n/a
10	white	n/a
11	pink	R1-closure
12	light green	R1-middle
13	black/white	R1-opener
14	brown/white	n/a
15	red/white	n/a
16	orange/white	n/a
17	blue/white	R_failure_closure
18	purple/white	R_failure_middle
19	green/white	R_failure_opener
20	red/black	n/a

The Nurse Call relay functions as follows:

- During standard operation R1,R2,R3 _opener are closed; R1,R2,R3_closure are open.
- During alarm condition—R1,R2,R3_opener are open; R1,R2,R3_closure are closed.

Tools required: Ohmmeter.

1 Plug an M8087-61001 cable into the Nurse Call Relay connector.

2 Connect the ohmmeter and measure the pins as indicated in the diagram and table.

3 The relay contacts should behave as described above. The behavior may vary depending on configuration choices. See the Configuration Guide for details on Alarm Relay settings.

ECG Sync Performance Test

This test checks the performance of ECG synchronization between the monitor and a defibrillator. It only needs to be performed when this feature is in use as a protocol at the customer site.

Tools required:

- Defibrillator with ECG Sync and Marker Output.
- Patient simulator.

1 Connect the patient simulator to the ECG connector on the Measurement server and the defibrillator to the ECG Sync Output on the monitor.

2 Set the patient simulator to the following configuration:

– HR = 100 bpm.

– ECG sinus rhythm.

3 Switch the defibrillator to simulation mode.

4 Check that the marker pulse is displayed before the T-wave begins.

Docking Station Performance Test

1 Place the monitor on the docking station and close the lever.

2 Check that the green power LED lights up when the docking station is connected to AC Power.

3 Check that the monitor's AC Power LED lights up to indicate it is receiving power through the docking station.

VueLink Tests using VueLink Test Module

Use the VueLink plug-in test module (M1186-60510) to test M1032A VueLink modules.

Test Procedure

You must preselect the test module to ON in Configuration Mode. Therefore, the test module must be one of the devices made available for selection during configuration of the VueLink module.

Carry out the test itself in monitoring mode. For information concerning the configuration of VueLink modules see the M1032A VueLink Module Handbook.

1 Plug the VueLink module into the FMSmodule slot.

2 Press the Setup key on the front of the VueLink module.

3 Press **Setup VueLink** in the pop-up key area.

4 In the **Setup VueLink** menu select **Device**, then select **Test Module**.

5 Select **Confirm** to store the selection and wait for the message "Switched to new device".

6 Plug in the test module.

7 Connect the modules by plugging one end of the cable (part number M1032-61661) into the connector on the front of the VueLink Module, and the other end into the connector on the front of the Test Module.

8 Select the wave segment on the screen, where you want the waves to appear. In the wave menu, select **Change Wave**, then select **WAVE**.

9 Select the **VueLink** SmartKey, then select the **TEST Plug-In** pop-up key

The test module acts in the same way as an external device would, and sends signals to the VueLink module in both analog and digital form. The computer module checks these signals for validity, and then displays "passed" or "failed" on the screen.

The wave segment displays two waveforms, a triangular one and a rectangular one. These are displayed alternately and for a period of ten seconds each. The expected curve type is indicated below the wave.

There are two pairs of gridlines that indicate the permitted range for the max/min values of these waves. If all the data received by the test module is correct, the waves will lie within the specified ranges. If either limit of either wave falls outside the respective gridlines, then the module being tested is faulty regardless of the passed/failed messages.

When the test is complete:

1 Disconnect the cable that joins the test module to the VueLink module.

2 In configuration mode, ensure that the test module is not selected, and the preselected devices are the same ones as before the test. Also, verify the settings for these devices.

3 Return to monitoring mode.

4 Press the Setup key on the front of the VueLink module and select the required device by selecting **Device** in the **Setup VueLink** menu.

NOTE It is important to ensure that the preselected device drivers are configured exactly the same as they were before the test, including their default settings.

IIT Communication Test

1 Make sure the LAN cable is disconnected from the rear of the monitor, then switch on the monitor.

2 Go into Configuration mode and, in the **Network** menu, set the **RF Access Code** in each profile to match your installation.

3 Go into Service Mode. Select **Main Setup** -> **Instr. Telemetry** to access the Instrument Telemetry Service window.

4 Proper installation of the IIT module is assured by connecting to an access point over the wireless link. Place the monitor with the IIT module installed in close proximity to the access point (e.g. if the access point is mounted on the ceiling, place the monitor directly below). Wait until the **Conn.Status** field in the Instrument Telemetry Service window shows *Active.* Take the monitor approximately 5 m away from the access point. There should be no walls or other obstacles between the monitor and the access point. The following should apply:

– Observe the **RSSI** (Received Signal Strength Indicator) value for at least 5 - 10 seconds. The **RSSI** value should be around -50 ±10 in a 5 m distance from the access point used and the IIT link should be active, i.e. the **Conn.Status** field should be *Active* and the other fields should contain values. If the **RSSI** value is significantly lower, check the distance to the access point and the antenna orientation at both the monitor and the access point (both should be vertical).

– Remove the antenna. The **RSSI** value should be around -90 ±10. The IIT link may be active but the connection could be unreliable. The **Conn. Status** field may toggle between *Inactive* and *Seeking.* If the difference between the **RSSI** values measured with and without antenna is significantly lower, check the antenna and the antenna connector for damage.

5 If this test fails, retry in a different physical area with a different access point.

Error Conditions:

– The field **MAC Instr. Tele** should show a value **unequal to** 0000 0000 0000. If it does not, there is a communication problem between the monitor and the IIT adapter.

– With an incorrect RF Access Code or an incorrect or defective antenna installation, the fields **IP Address, Server IP**, **Subnet Mask**, and **RSSI** in the Instrument Telemetry Service window will stay blank. The field **Conn. Status** will slowly toggle between *Inactive* and *Seeking*.

6 Perform the Access Point Controller (APC) test blocks as described in the Philips IntelliVue Wireless Network Installation and Configuration Guide.

IntelliVue 802.11 Bedside Adapter Communication Test

1 Make sure the LAN cable is disconnected from the rear of the monitor, then switch on the monitor.

2 Go into Service Mode and select **Main Setup** -> **Network** -> **Setup WLAN.** In the **Setup WLAN** menu:

– set **Mode** to either **802.11Ah**, **802.11G**, **802.11Bg** (not recommended), **Auto** (not recommended) or **None** (this setting disables the wireless LAN functionality permanently), to match your wireless infrastructure installation.

– set **SSID** to match your installation.

– set the **Country** code to "1000". Setting the country code to this value will automatically adjust the regulatory domain to match the configuration of the infrastructure. Do not set the country code to values other than "1000" unless otherwise instructed.

– set the **Security Mode** to **WPA(PSK)** and enter the **WPA password** (string between 8 and 63 characters).

3 Select **Main Setup** -> **WLAN Diagnostic** to access the service window.

4 Proper installation of the IntelliVue 802.11 Bedside Adapter is assured by connecting to an access point over the wireless link. Place the monitor with the IntelliVue 802.11 Bedside Adapter installed in close proximity to the access point (e.g. if the access point is mounted on the ceiling, place the monitor directly below). Wait until the **Conn.Status** field in the service window shows *Authenticatd* (for Rel. C.0 monitors) or *Connected* (for Rel D.0 or higher). Take the monitor approximately 5 m away from the access point. There should be no walls or other obstacles between the monitor and the access point. The following should apply:

– Observe the **RSSI** (Received Signal Strength Indicator) value for at least 5 - 10 seconds. The **RSSI** value wil fluctuate but should stay above 30 in a 5 m distance from the access point used. The wireless link should be active, i.e. the **Conn.Status** field should be *Authenticatd* (for Rel. C.0 monitors) or *Connected* (for Rel D.0 or higher), and the other fields should contain values. If the **RSSI** value is significantly lower, check the distance to the access point and the antenna orientation at the monitor. The antenna orientation should be vertical, but the physical placement of the monitor or other equipment within its vicinity as well as walls or other obstacles may influence the antenna orientation required to receive the best RSSI value.

5 If this test fails, retry in a different physical area with a different access point.

6 Perform the Wireless Switch test blocks as described in the Philips IntelliVue 802.11 a/g Infrastructure Installation and Configuration Guide.

Safety Testing

You are recommended to file the results of safety tests. This may help to identify a problem early particularly if the test results deteriorate over a period of time.

Warnings, Cautions, and Safety Precautions

- These tests are a proven means of detecting abnormalities that, if undetected, could prove dangerous to either the patient or the operator.

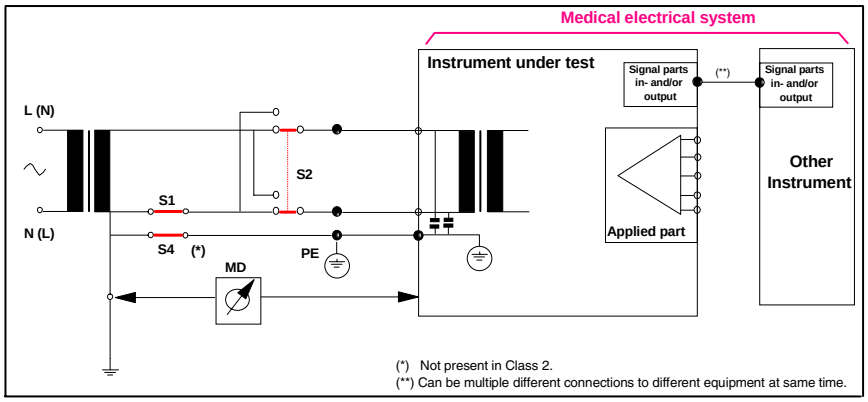
- You can perform all tests using commercially available ***Safety Analyzer*** test equipment. You can perform basic measurements with widely available multifunction instruments such as the HP 3469A multimeter or equivalent.
- The consistent use of a ***Safety Analyzer*** as a routine step in closing a repair or upgrade is emphasized as a mandatory step to maintain approval agency status. You can also use the ***Safety Analyzer*** as a troubleshooting tool to detect abnormalities of line voltage and grounding plus total current loads.
- For Europe and Asia/Pacific according to:
 IEC60601-1:1988 + A1:1991 + A2:1995 = EN60601-1:1990 +A1:1991 + A2:1995
 For USA according to:
 UL2601-1/UL60601-1
- Additional tests may be required according to local regulations.
- Normally, a ***Safety Analyzer*** is used to perform these procedures. Popular testers include the DEMPSEY 232D, or for use in Europe, testers like the Rigel, Metron or Gerb. Follow the instructions of the Instrument manufacturer. If the Dempsey is used for an extended length of time, it could be damaged by the high amp current draw of the system.
- Any device with mains connection that is connected to the medical device must comply with IEC60601-1 if within patient vicinity and be separately tested at the same intervals as the monitor.
- Any device with mains connection that is connected to the medical device must comply with IEC60601-1-1 if outside patient vicinity and be tested accordingly.

Safety Test Procedures

Use the test procedures outlined here **only** for verifying safe installation or service of the product. The setups used for these tests and the acceptable ranges of values are derived from local and international standards but may not be equivalent. These tests are not a substitute for local safety testing where it is required for an installation or a service event. If using the Metron Safety tester, perform the tests in accordance with your local regulations, for example in Europe use IEC60601-1/IEC60601-1-1 and in the US use UL2601-1. The Metron Report should print results with the names listed below, together with other data.

NOTE For any system with external displays: Disconnect the display from the medical device and perform S(1) and S(2) on each device with a mains cable. If both pass the tests reconnect the display and proceed with normal use.

S(1) Part 1: System Enclosure Leakage Current - NC (normal condition)



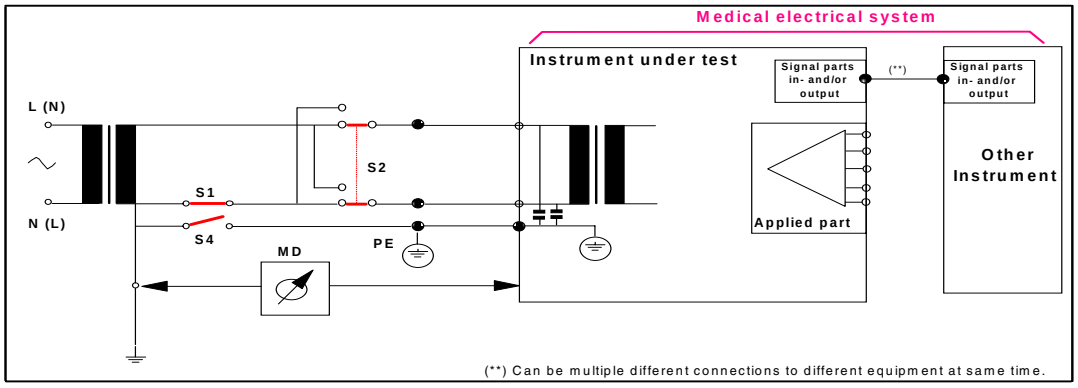
Expected test results:

- Normal condition maximum leakage current x1 ≤ 100µA

This measures leakage current of exposed metal parts of Instrument under Test (IUT) and between parts of the system within the **patient environment**; normal and reversed polarity using S2.

Safety test according IEC 60601-1 / UL2601-1

S(1) Part 2: System Enclosure Leakage current - Single Fault (open earth)



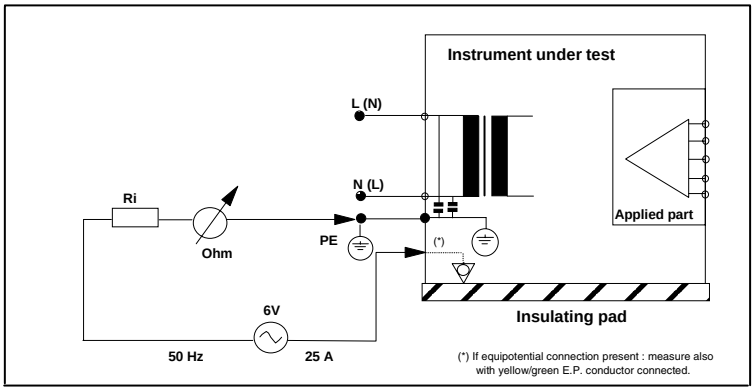
Expected test results:

- Single Fault maximum leakage current x2 ≤ 500µA (IEC 60601-1)

≤ 300µA (UL2601-1)

This measures leakage current of exposed metal parts of Instrument under Test (IUT) with Protective Earth (PE) open circuit (S4 = open) and between parts of the system within the **patient environment**; normal and reversed polarity using S2.

S(2) Protective Earth Continuity

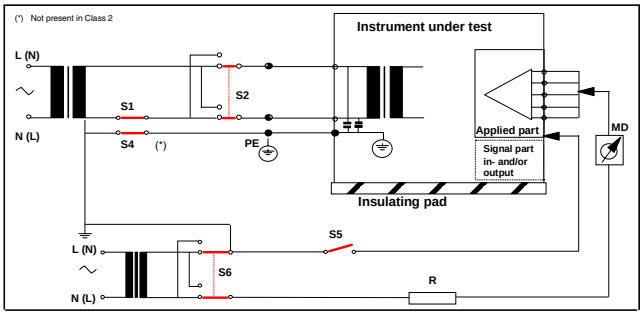


Expected test results:

- With mains cable, maximum impedance x = 100 mOhms (IEC 60601-1 and UL2601-1)

This measures impedance of Protective Earth (PE) terminal to all exposed metal parts of Instrument under Test (IUT), which are for safety reasons connected to the Protective Earth (PE). Test current 25 Amp applied for 5 to 10 seconds.

S(3) Patient Leakage current - Single Fault Condition (S.F.C.) mains on applied part



Expected test results:

- Maximum leakage current, x = 50µA @ 250V (IEC60601-1 and UL2601-1)

Measures patient leakage current from applied Part to earth caused by external main voltage on applied Part with switch S5 open and closed. Each polarity combination possible is tested using S2 and S6. This test is applicable for every measurement input .

Battery Handling, Maintenance and Good Practices

This section provides some information on how to handle and maintain the batteries in order to get the best usage from them. Additionally, some good working practices are also given regarding the correct disposal of the batteries. This section only applies if a battery board is installed in the monitor.

NOTE The monitor requires two batteries for operation. Both batteries' charging status should ideally be the same and should not differ more than 50%.

NOTE If your monitor is connected to an IntelliVue Information Center, you should make sure that the IIC uses the text catalog revision B.1 or later, otherwise battery INOPs may not display correctly on the IIC. Consult your IIC documentation for instructions on upgrading the text catalog.

About the Battery

The rechargeable Lithium-Ion batteries used in the monitor are regarded as *Smart* batteries because they have built-in circuitry. (This circuitry communicates battery-status information to the Monitor.)

To get the most out of the batteries, observe the following guidelines:

- Condition the batteries only upon maintenance request prompt on display.
- **If a battery shows damage or signs of leakage, replace it immediately. Do not use a faulty battery in the Monitor.**
- Capabilities of integrated battery charger: 12.6V, 5 Amps mx.
 Actual current / voltage: depends on smart battery request and monitor configuration
 The approximate charging time is 4 hours with the monitor switched off and up to 12 hours during monitor operation, depending on the monitor configuration.
- **Battery Disposal**—Batteries should be disposed of in an environmentally-responsible manner. Consult the hospital administrator or your local Philips representative for local arrangements. **Do not dispose of the battery in normal waste containers.**
- **Battery Storage** — Batteries should not remain inside the monitor if they are not used for a longer period of time. Batteries should be max. 50% charged for storage.

NOTE Batteries will discharge within about 20 days if they are stored inside the monitor without AC power connection.

Checking the Battery Status

When the Monitor is connected to the AC power supply, the battery charges automatically. The battery can be charged remotely from the Monitor by using the battery charger. Use only Lithium Ion battery chargers approved by Philips.

Battery status (level of charge) is indicated several ways:

- LED on the front panel of the Monitor.
- Battery gauge.
- Display of battery time below gauge.

- Battery status window.
- INOP messages.

The AC Power LED is only on when the power cord is connected and AC power is available to the Monitor. In this case, the battery can be either charging or fully charged.

The battery LED can be green, yellow, or red depending on the following conditions:

Battery LED Colors	If the monitor is connected to AC power, this means	If the monitor is running on battery power, this means
Green	batteries full (>90%)	
Yellow	batteries charging[1] (battery power < 90%) or battery down[2]	
Red, flashing		less than 10 minutes power remaining
Red, flashes intermittently	battery malfunction	battery malfunction
Red, flashes once when on/ standby switch is pressed		not enough battery power left to power monitor

[1] indicated by malfunction symbol and INOP
[2] indicated by “battery has no power left” symbol

If only one battery is inserted during charging, the battery LED is yellow during charging and switches off when the battery is charged.

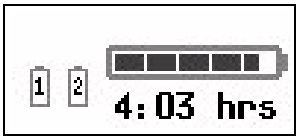
NOTE If the batteries were charged to 100%, they will not charge again until the charging status goes below 90%.

If the remaining battery-operating time is less than 10 minutes, the LED flashes red at a repetition rate of approximately 1.5 flashes per second.

When the batteries are empty, the Monitor switches off automatically (including the green On-Off/ Standby LED on the front panel). Attempts to restart the Monitor (by pressing the On-Off/Standby) causes the red LED to emit a single flash. (The flash may have a delay of up to 2.5 sec after pressing the On-Off/Standby key). In this case either recharge the batteries (externally or internally) or exchange the batteries.

NOTE If the batteries become too warm or too cold, they will not begin the recharging cycle until the battery temperature is within range.

Battery Status on the Main Screen

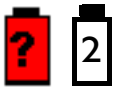
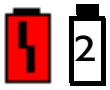
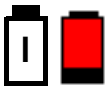


Battery status information can be configured to display permanently on all Screens. It shows the status of each of the batteries and the combined battery power and battery time remaining. These symbols are displayed if a battery board is installed, no matter whether batteries are inserted or not.

Battery status symbols: These symbols tell you the status of the batteries detected and which battery compartment they are in, either 1 or 2.

Battery power gauge: This shows the remaining battery power in the combined batteries. It is divided into sections, each representing 20% of the total power. If three and a half sections are shaded, as in this example, this indicates that 70% battery power remains. If no batteries are detected, the battery gauge is greyed out.

Battery malfunction symbols: If a problem is detected with one of the batteries, these symbols alternate with the battery number to indicate which battery is affected. They may be accompanied by an INOP message or by a battery status message in the monitor information line (if battery window is open) providing more details.

Battery status symbols			**Battery malfunction symbols**		
					
Battery 1 is present	Battery compartments are empty	Battery requires maintenance	Incompatible battery (Battery 1)	Battery malfunction (Battery 1)	Battery 2 is missing, insert battery
					
battery is empty	battery not charging as the temperature is above or below the specified range			(red) battery temperature too high	Battery 2 has no power left

Explanations of Battery Status and Malfunction Symbols:

Battery requires maintenance: The batteries require conditioning. Refer to “Conditioning Batteries” for details.

Incompatible Battery: The inserted batteries are checked for certain battery internal parameters. If these are not correct, the incompatible battery symbol is displayed. Please use only the M4605A batteries with the MP40/50 monitor. Note that the incompatible battery symbol may also appear if there is a communication problem between the battery and the battery board.

Temperature outside specified range: The charging of the battery is stopped if the temperature is below 15°C or above 50°C in order to protect the battery. Charging is resumed as soon as the temperature is within this range.

Battery Temperature too high: This symbol is displayed if the battery temperature goes above 65°C. In addition the INOP message CHECK BATT TEMP is displayed. If the battery temperature increases further above 70°C the batteries will switch off for safety reasons. Allow the batteries to cool down to avoid the monitor switching off.

Battery is empty: The capacity of the battery is ≤200 mAh. Recharge the battery as soon as possible.

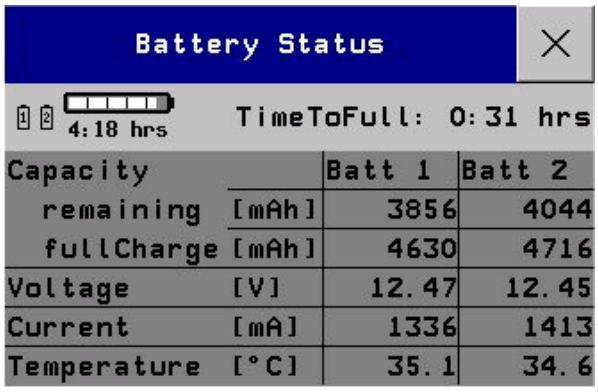
Battery has no power left: Either the battery has switched off power delivery but is still communicating with the battery board - in this case recharge the battery immediately - or the battery is in deep discharge, i.e. it has switched off power delivery, has stopped communicating with the battery board and requires pre-charging to restore communication. The INOP CHARGE BATT 1/ BATT 2 is issued to indicate that pre-charging is required. To avoid this condition charge batteries to 50% for storage. Note that the battery malfunction INOP will eventually be issued if the pre-charging does not restore battery communication within about 10 minutes.

Battery Malfunction:Communication between the battery and the battery board could not be established within about 10 minutes or battery internal data indicates malfunction. Please see the "Troubleshooting" section for remedies.

NOTE If both batteries are malfunctioning or incompatible or require pre-charging and the monitor is not connected to AC power, it will switch off automatically for safety reasons.

Battery Status Window

- To access the **Battery Status** window and its associated pop-up keys, select the battery status information on the Screen, or select **Main Setup** -> **Battery**.



Capacity, Remaining tells you how much power is left in each battery.

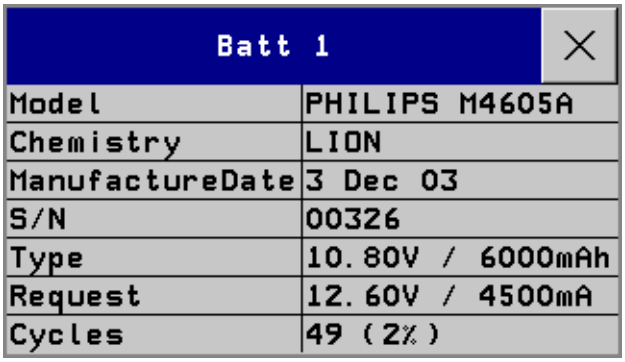
Capacity, Full Charge tells you how much power each battery can hold when fully charged.

Time To Empty tells you approximately how long you can continue to use the monitor with these batteries. Note that this time fluctuates depending on the system load (how many measurements and recordings you carry out), the age of the battery, and the remaining capacity of the battery. The time indication is blanked after unplugging AC or after changing batteries for about 30 seconds (during calculation of the Time to Empty)

Time To Full is shown in place of **Time To Empty** if the monitor is connected to AC power, and tells you how much time is left until the batteries are charged to 90%. Please allow indication to stabilize for 3 to 5 minutes after beginning the charging cycle. If batteries are charged over 90% **Batteries Full (>90%)** is displayed until they are charged to 100%. Then **Batt1/Batt2 Fully Charged** is displayed.

Viewing Individual Battery Status

- To view information for individual batteries, select the pop-up key **Battery 1** or **Battery 2**.



Documenting Battery Status

To print all battery information in the **Battery Status** window,

1 Select the battery status information on the Screen or select **Main Setup** -> **Battery** to open the **Battery Status** window

2 Select the **Record Status** pop-up key to print the information on a connected recorder

or

Select the **Print Status** pop-up key to print the information on a connected printer.

Battery Implications

If the batteries are not equally charged and one battery is very low on power the INOP “Battery 1 or 2 empty” may appear. This means that this battery cannot contribute to powering the monitor anymore. In this case exchange the indicated battery with a charged battery or connect the monitor to AC power to charge both batteries.

Conditioning a Battery

What is Battery Conditioning?

Battery conditioning recalibrates the battery to ensure that it has accurate information on the actual battery capacity.

Why is Battery Conditioning Necessary?

The capacity of a battery decreases gradually over the lifetime of a battery. Each time a battery is charged its capacity decreases slightly. Therefore, the operating time of a monitor running on batteries also decreases with each charge cycle.

Battery conditioning ensures that the value stored in the battery for its full capacity takes account of this decrease, so that the remaining battery charge can be calculated accurately, and the low battery warning given at the right time.

When Should Battery Conditioning be Performed?

Battery conditioning should be performed when indicated by the Battery Status.

NOTE When the battery status signals a conditioning request, the displayed **Time to Full** or **Time to Empty** may not be reliable.

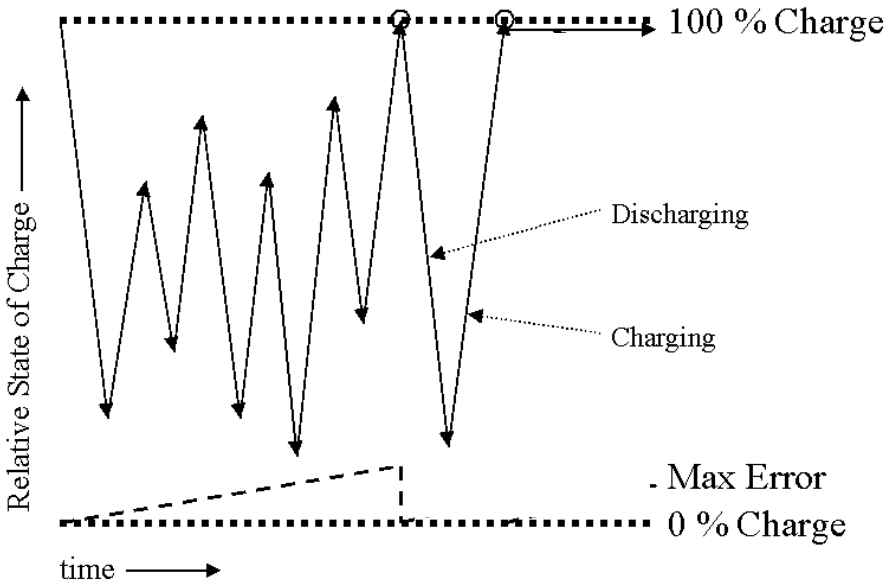
What Causes the Conditioning Message on the Monitor?

In addition to the value for the full capacity, the battery also stores a value for the Max Error. The Max Error tracks the maximum possible deviation of the estimated charge of a battery from the actual charge.

If a battery is charged or discharged partially, or if it is charged while the monitor is being used, the accuracy of the "reference points" for the fully discharged and fully charged states decreases, causing an increase in the value for the Max Error (see diagram, below).

When the Max Error rises over a certain limit, a message is displayed prompting the user to condition the battery, as described in "Conditioning Batteries" on page 68.

You can reset the value for the Max Error before the battery needs conditioning, by performing the steps described in"Conditioning Batteries". The minimum value of the Max Error after conditioning is 2%.



Conditioning Batteries

Battery conditioning can either be performed in the monitor or with an external battery charger.

Battery Conditioning in the Monitor

CAUTION Do not use a monitor being used to monitor patients to condition batteries. The monitor switches off automatically when the batteries are empty.

You should condition a battery when its “battery requires maintenance” symbol shows on the Screen. If conditioning is not performed immediately the monitor will still function according to specifications. However, the displayed time to empty and time to full will show increasing inaccuracy. Do not interrupt the charge or discharge cycle during conditioning. To condition a battery,

1 Insert the battery into a monitor connected to mains power.

2 Charge the battery until it is completely full. Switch the monitor off to decrease the charging time When the battery LED turns green i.e. the batteries are >90% charged, switch on the monitor and open the **Battery Status** window. Check that the **Batteries fully charged** or **Battery 1** / **Battery 2 fully charged** message is displayed.

3 Disconnect the monitor from mains power, and let the monitor run until the battery is empty and the monitor switches itself off.

4 Reconnect the monitor to mains power and charge the battery until it is full for use or charge to 50% for storage.

Battery Conditioning with an External Charger

You can use the M8043A Smart Battery Charger for external battery conditioning. For details please see the IfU for the Smart Battery Charger.

Touchscreen Calibration

To access the touchscreen calibration screen:

1 Enter service mode

2 Select **Main Setup**

3 Select **Hardware**

4 Select **Touch Calibration**

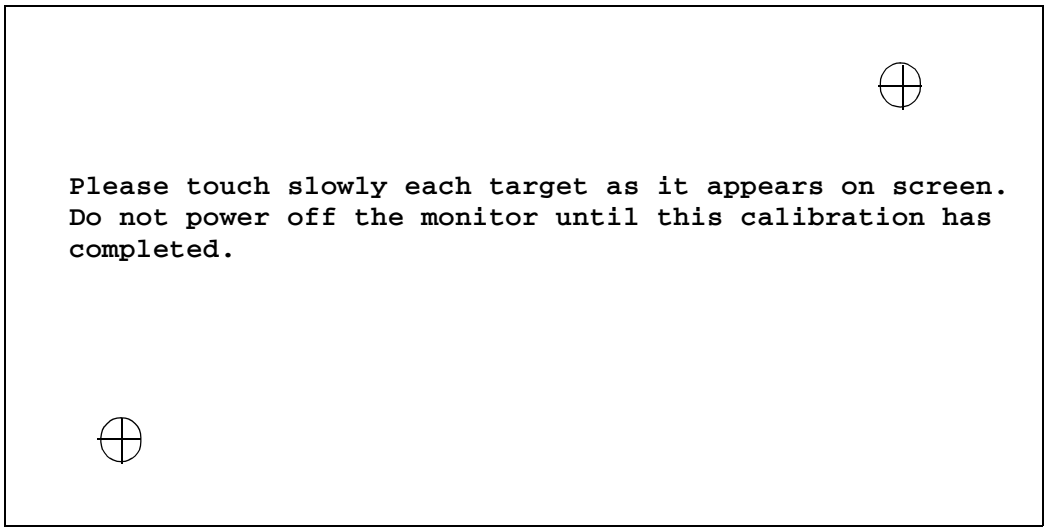


Figure 9 Touchscreen Calibration Screen

Make sure you complete the calibration procedure without powering off the monitor mid-way. If the monitor is powered off after the first point is touched, the touch panel will be deactivated until the touch calibration is performed again.

If the touchscreen is accidentally mis-calibrated by selecting the wrong spot, you must use another input device to re-enter calibration mode. If you have the support tool, you can select **`Reset Touch Calibration to Default`** and it will create a rough calibration which will allow you to access the calibration menu again via the touchscreen.

Disabling/Enabling Touch Operation

There are two ways to disable/enable touchscreen operation:

1 To *temporarily* disable touchscreen operation of the monitor, press and hold the **Main Screen** key. A padlock symbol will appear on the key. Press and hold the **Main Screen** key again to re-enable touchscreen operation.

2 To *permanently* disable touchscreen operation:

a. Enter Service Mode.

b. Select **Main Setup**

c. Select **User Interface**

d. Change the **Touch Enable** selection to **no**.

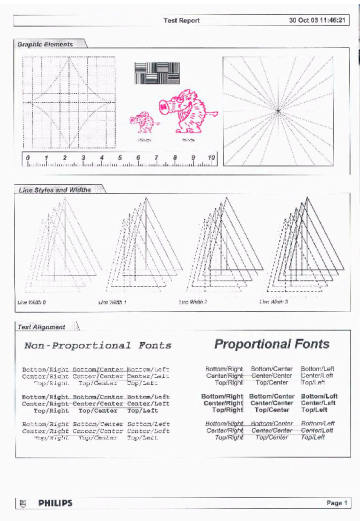
To re-enable touchscreen functionality change the **Touch Enable** selection to **yes**.

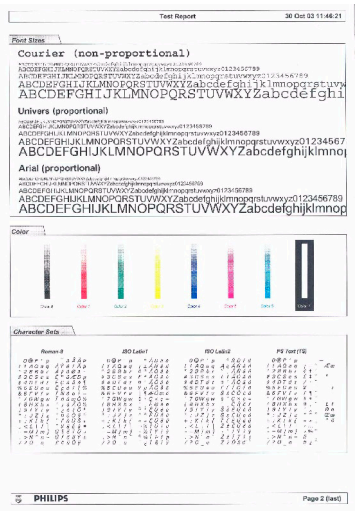
Printer Test Report

To verify your printer configuration you may want to print a test report.

To print a test report select **Main Setup -> Reports -> Setup Printers -> Print Test Rep.**

Your test report should look like this:





4

Troubleshooting

Introduction

This section explains how to troubleshoot the monitor if problems arise. Links to tables that list possible monitor difficulties are supplied, along with probable causes, and recommended actions to correct the difficulty.

How To Use This Section

Use this section in conjunction with the sections *Testing and Maintenance* and *Parts*. To remove and replace a part you suspect is defective, follow the instructions in the section *Repair and Disassembly*. The *Theory of Operation* section offers information on how the monitor functions.

Who Should Perform Repairs

Only qualified service personnel should open the monitor housing, remove and replace components, or make adjustments. If your medical facility does not have qualified service personnel, contact Philips' Response Center or your local Philips representative.

WARNING High Voltage - Voltages dangerous to life are present in the instrument when it is connected to the mains power supply or a battery. Do not perform any disassembly procedures (other than server, extension or module removal) with power applied to or batteries inserted into the instrument. Failure to adhere to this warning could cause serious injury or death.

Replacement Level Supported

The replacement level supported for this product is to the printed circuit board (PCB) and major subassembly level. Once you isolate a suspected PCB, follow the procedures in the *Repair and Disassembly* section, to replace the PCB with a known good PCB. Check to see if the symptom disappears and that the monitor passes all performance tests. If the symptom persists, swap back the replacement PCB with the suspected malfunctioning PCB (the original PCB that was installed when you started troubleshooting) and continue troubleshooting as directed in this section.

Software Revision Check

Some troubleshooting tasks may require that you identify the Software Revision of your monitor. You can find the software revision along with other information, such as the system serial number, in the monitor revision screen.To access the monitor revision screen:

1 Enter the Main Setup menu and select **Revision**

2 Select **Product**

3 Select **Software Revision**

4 Select the pop-up key for the device you want to check (e.g. **M8004A** or **M3001A)**

NOTE The part numbers listed in the monitor revision screen do not necessarily reflect the part numbers required for ordering parts. Please refer to the *Parts* section for the ordering numbers.

NOTE The system serial number can also be found on the lower right corner on the front of the monitor.

Software Compatibility Matrix

NOTE The M8048A Flexible Module Server (FMS) and the M3000A MMS are not supported.

Software Revision Marketing Name	M8003/4A	M3001A
B.0 - supported		
Released Revison	B.05.71	C.00.81
Compatible Revision	B.05.67	A.20.27 B.05.73 B.10.83
B.1 - supported		
Released Revision	B.10.85	C.00.81
Compatible Revision	B.10.80 B.10.84	A.20.27 B.05.73 B.10.83
C.0 - supported		
Released Revision	C.00.xx	C.00.81
Compatible Revision	B.10.80 B.10.84 B.10.85	A.20.27 B.05.73 B.10.83
D.0 - supported		
Released Revision	D.00.xx	C.00.81
Compatible Revision	B.10.80 B.10.84 B.10.85 C.00.82 C.00.89	A.20.27 B.05.73 B.10.83

Obtaining Replacement Parts

See *Parts* section for details on part replacements.

Troubleshooting Guide

Problems with the monitor are separated into the categories indicated in the following sections and tables. Check for obvious problems first. If further troubleshooting instructions are required refer to the Troubleshooting Tables.

Taking the recommended actions discussed in this section will correct the majority of problems you may encounter. However, problems not covered here can be resolved by calling Philips Response Center or your local representative.

Checks for Obvious Problems

When first troubleshooting the instrument, check for obvious problems by answering basic questions such as the following:

1 Is the power switch turned on?

2 Is the battery adequately charged?

3 Is the AC power cord connected to the instrument and plugged into an AC outlet?

4 Are the MMS and, if present, the measurement server extension inserted correctly?

5 Are the parameter modules plugged into the 4-slot rack correctly?

Checks Before Opening the Instrument

You can isolate many problems by observing indicators on the instrument before it is necessary to open the instrument.

NOTE It takes several seconds for the AC Power LED to switch on / off after the mains power cord has been connected / disconnected.

Checks with the Instrument switched Off

- AC connected, without battery:
 - AC Power LED is on (green).
- AC connected, with battery:
 - AC Power LED is on (green).
 - Battery LED is green if fully loaded, yellow if being charged and off if only one battery is inserted and fully charged.
 - Battery LED red and blinking signals battery malfunction.
- No AC connected, with battery:
 - All LEDs are off.

Checks with the Instrument Switched On, AC connected, without battery

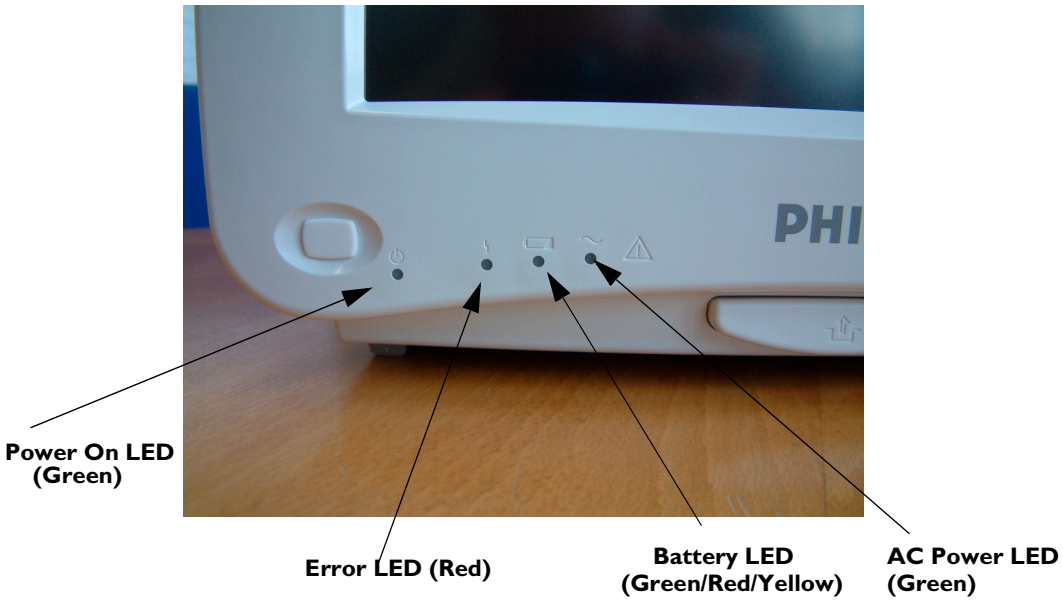
When the monitor is first switched on, the Power On LED and the AC Power LED switch on and stay on. The Error LED and the Battery LED light up momentarily.

Checks with the Instrument switched On, AC connected, with battery

When the monitor is first switched on, the Power On LED and the AC Power LED switch on and stay on. The Error LED and the Battery LED light up momentarily. Before and after the Battery LED flashes it shows the current battery status as described in the Testing and Maintenance section.

Checks with the Instrument switched On, AC not connected, with battery

When the monitor is first switched on, the Power On LED switches on and stays on. The AC Power LED, the Error LED and the Battery LED light up momentarily.



Initial Instrument Boot Phase

The following tables describe the regular initial boot phase of the monitor and its components. If the boot phase does not proceed as described below go to Boot Phase Failures for Troubleshooting information.

Monitor Boot Phase:

For these steps it is assumed that the Monitor is powered correctly and the +3,3 V System Board supply voltage is okay. This is indicated by the green Power On LED.

Time (sec.) after Power On	Event
0	When the Power On/Off button is pressed, the green Power On LED and the red error LED switch on immediately.
3	The alarm LEDs are switched on with low intensity. Colors: Left LED:cyan; Middle LED:red; Alarm Suspend LED (right): red. Red Error LED is switched off.

Time (sec.) after Power On	Event
5	Boot Screen with the Philips Logo appears on the display. Test Sound is issued.
9	All Alarm LEDs are switched off.
10	Alarm LEDs are tested in the following sequence: Cyan on-off (left LED only) Yellow on-off (left & middle LED) Red on-off (all LEDs)
	Boot Screen with the Philips Logo disappears
	Fixed screen elements (for example smart keys, alarm fields) appear on the screen.
15-30	First measurement information appears on the screen,user input devices (for example Mouse, Touch, Navigation Point) are functional

Troubleshooting Tables

The following tables list troubleshooting activities sorted according to symptoms. Click on the links below to view a particular table.

How to use the Troubleshooting tables

The possible causes of failure and the remedies listed in the troubleshooting tables should be checked and performed in the order they appear in the tables. Always move on to the next symptom until the problem is solved.

Boot Phase Failures

Integrated Display is blank

Integrated Touch Display not functioning

External Display is blank (Slave Display)

External Touch Display not functioning

Remote Alarm Device

Remote Extension Device

Navigation Point

Keyboard/Mouse not functioning

Battery related problems

Network related problems

Wireless Ethernet Adapter (Proxim)

Multi-Measurement Server

MSL-related problems

Alarm Lamps

Alarm Tones

Individual Parameter INOPS

Integrated 4-Slot Rack

Printer

MIB / RS232

Flexible Nurse Call Relay

Boot Phase Failures

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
AC LED does not light up	AC Connection not ok	Check that the AC-Mains are powered and the power cord is ok and connected
	Flat panel adapter not connected to the main board	Check if flat panel adapter is connected correctly to the Main Board
	LED defective	Try to switch on the monitor. If it operates normally , the LED is defective => exchange Flat Panel Adapter.
	Integrated 4-Slot Rack defective	Remove Integrated Module Slot and check again
	Main Board defective	Exchange Main Board
	Power supply defective	Exchange Power Supply
Green Power On LED **and** Red Error LED remain off after pressing power on button:	Remote Devices	Disconnect all connections to the remote devices and try to switch on the monitor again
	Power Switch Micro Controller hung	Unplug AC Mains and replug after 10 seconds. Try to switch on the monitor again.
	Flat panel adapter not connected to the main board	Check if flat panel adapter is connected correctly to the main board.
	I/O Board defective	Remove all I/O boards and try to switch the monitor on again
	Touch controller defective Navigation Point defective ECG Out board defective MSL board defective	Disconnect cables and boards: (except Power DC/DC cable and Flex Panel Adapter): - touch board from Flex - Navigation Point - ECG Out - MSL then try to switch on the monitor again.
	Flat panel adapter defective	Exchange flat panel adapter and try to switch the monitor on again.
	Integrated 4-Slot Rack defective	Exchange integrated 4-Slot Rack and try again
	Main Board defective	Exchange main board. Add boards in reverse order and try again with each board.
Green On/ Standby LED **or** Red Error LED remain off after pressing Power on button:	Flat panel adapter not connected to the main board	check if flat panel adapter is connected correctly to the main board
	Flat panel adapter defective	exchange flat panel adapter
	Main board defective	exchange main board

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Red Error LED stays on continuously	External connected device defective	disconnect all external cables (except AC) and switch the monitor on again
	I/O Board defective	Remove all I/O boards and switch the monitor on again.
	Touch controller defective Navigation Point defective ECG Out board defective MSL board defective	Disconnect cables and boards: (except Power DC/DC cable and Flex Panel Adapter): - touch board from Flex - Navigation Point - ECG Out - MSL then try to switch on the monitor again.
	Measurement Server Mount defective	Disconnect Measurement Server Mount and switch on again
	Main board defective	Exchange Main board
	Integrated 4-Slot rack defective	Exchange integrated 4-slot rack and switch on again
Red Error LED blinks (indicating cyclic reboots)	Hardware Failure	connect Support Tool directly to monitor with crossover cable and start “search for defective devices” If no device is detected, proceed as described above in section “Red error LED stays on continuously”
	Software Fault	If the Support Tool can detect the device and it indicates the Operating Mode is ‘Boot’, download and store the status log. Reload software and re-clone the monitor. If this fixes the problem e-mail the status log to your local response center
	Hardware Failure	If this does not rectify the problem follow instructions under “Red Error LED stays on continuously”.
Alarm LEDs remain off:	ECG Out / Alarm LED board is defective	Check for INOPS and follow instructions Exchange Alarm LED board
	Main board defective	Exchange Main board
No Test Sound issued	Speaker defective	check for INOPs and follow instructions exchange speaker
	Main board defective	exchange main board

Integrated Display is blank

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Integrated display is blank or brightness is reduced (The information listed in this table is only valid if the boot phase has completed without error. See Boot Phase Failures table for a description of the Boot phase.)	Display brightness is reduced when room temperature, or instruments placed near patient monitor, causes the monitor display to overheat.	Instrument should be placed in an environment that does not exceed 35 degrees C or below 5 degrees C.
		If you have an external display, connect it to the video port. If the external display works, you can eliminate the main board as the cause of failure.
	Flat Panel Adapter flex not connected	Check flex connection of Flat Panel Adapter Board to main board and display
	Backlight Inverter Cable not connected	Check cable connection of Flat Panel AdapterBoard to Backlight Inverter Board
	Backlight tubes defective	Replace backlight tubes
	Backlight Inverter board defective	If backlight tubes have already been replaced, replace backlight inverter board.
	Panel Adapter flex defective	Replace panel adapterflex
	LCD Flat panel defective	Replace LCD Flat panel
	Main board defective	Replace main board

Integrated Touch Display not functioning

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Touch Screen not functioning	Touchscreen functionality has been temporarily disabled	Check if touchscreen functioanlity has been temporarily disabled (padlock symbol on Main Screen key). If yes, press and hold the Main Screen key to re-enable touchscreen operation.
	Touchscreen functionality has been permanently disabled	In service mode, select Main Setup -> User Interface and change the “Touch Enable” selection to “yes”.
	Flat panel adapter not connected	Check connection from the flat panel adapter to the main board

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
	Touch controller not connected	Check connection from touch controller to flat panel adapter
	Touch panel cable not connected	Check connection from touch controller board to touch panel
	Touch controller board or touch sensor defective	Replace touch controller board and touch sensor **Note:** Linearization data must be loaded and recalibrated after replacing the touch controller board
	Main board defective	Replace main board
Touch Position invalid	Touch not calibrated	Perform touch calibration: 1. Enter the Main Setup Menu 2. Select Hardware 3. Select Touch Driver Settings 4. Select Calibrate

External Display is blank (Slave Display)

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
External Display is blank		If integrated display is also blank proceed as described under “Integrated Display is blank”
	Video cable to external display not connected	Check video cable connection to external display
	External display has no power	Check electricity supply of external display
	External display is defective	Check external display and video cable on another monitor or PC
	System Interface board defective	Replace System Interface board
	Main board defective	Replace main board

External Touch Display not functioning

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Touch Screen not functioning	Touchscreen functionality has been temporarily disabled	Check if touchscreen functionality has been temporarily disabled (padlock symbol on Main Screen key). If yes, press and hold the Main Screen key to re-enable touchscreen operation.
	Touchscreen functionality has been permanently disabled	In service mode, select Main Setup -> User Interface and change the “Touch Enable” selection to “yes”.
	External Touch cable not connected	Check cable connection from external touch to MIB board
	External Touch driver configuration	Check RS232/MIB configuration: 1. Enter Main Setup menu 2. Select Monitor 3. Select Hardware 4. Reconfigure RS232/MIB drivers 5. if problem persists, proceed to the next step
	MIB Board defective	Replace MIB board
	External touch defective	Replace external touch
	Main board defective	Replace Main board
Touch position invalid	Touch not calibrated	Perform touch calibration: 1. Enter Main Setup menu 2. Select Monitor 3. Select Hardware 4. Select Touch Driver 5. Select Calibrate

General Monitor INOP Messages

INOP Message	Possible Causes of Failure	Failure Isolation and Remedy
CHECKINTERNVOLTAGE CHECK MONITOR FUNC	Problem with too low voltages (5V, 12V) in the monitor. Alarm lamps, display or interfaces may not function correctly.	Remove all I/O boards and put them back in one at a time to isolate any defective board. If this does not resolve the problem, replace the main board

INOP Message	Possible Causes of Failure	Failure Isolation and Remedy
CHECK MONITOR TEMP	The temperature inside the monitor is too high	Check the environment for possible causes
	Monitor ventilation obstructed	Clean the monitor ventilation internally and then cool monitor down for 8 hours
	Main Board defective	replace Main Board
SETTINGS MALFUNCTION	Problem during cloning process.	Reclone configuration file
	Memory space in which the settings are stored has been corrupted	Reclone configuration file. This will reload the memory space.
	Main board defective	Replace Main board
INTERNAL COMM.MALF.	Problem with the I2C Bus communication in the monitor	Disconnect the external display and try another one
	Video board defective	Replace Video board
	Main board defective	Replace Main board

Remote Alarm Device

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Alarm LEDs illuminate, but no alarm sound is issued	speaker defective	replace remote alarm device
	remote device I/F defective	replace I/O board
Alarm occurs on screen, but no LED or alarm sound on the alarm device	cabling not connected	check cabling
	cabling defetive	replace cable
	I/O board defective	replace I/O board
	Remote Alarm Device defective	replace Remote Alarm Device
Alarm sound is isued, but no LEDs light up	LED failure	Replace Alarm Device

Remote Extension Device

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Remote input device (for example mouse/keyboard) attached to the Remote Extension Device does not function	Remote Extension Device is not connected to the monitor.	Check cabling and connections
	Input Device not connected properly	Check cabling to Input Device in the Remote Extension Device
	Input Device defective	Replace Input Device
	Remote Extension Device defective	Replace Remote Extension Device
	Remote Device I/O board in the wrong slot	Check I/O Matrix in *Installation Instructions*
	Remote Device I/O board defective	Replace I/O board
Buttons on the Remote Extension Device do not function but input device attached is functioning	Remote Extension Device defective	replace Remote Extension Device

Navigation Point

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Navigation Point attached directly to the monitor not functioning	Navigation Point not connected properly	Check cabling
	Navigation Point defective	Replace Navigation Point
Speed Point attached to Remote Extension Box not functioning	Remote Extension Device is not connected to the monitor.	Check cabling and connections
	Point not connected properly	Check cabling to SpeedPoint in the Remote Extension Device
	Point defective	Replace Point
	Remote Extension Device defective	Replace Remote Extension Device
	Remote Device I/O board in the wrong slot	Check I/O Matrix in *Installation Instructions*
	Remote Device I/O board defective	Replace I/O board
Navigation Point Knob Rotation, Joystick Control or Selection control not functioning	Navigation Point defective	Replace Navigation Point
INOP Message CHECK INPUT DEVICES is issued	Navigation Point or other input device defective	Perform a visual and functional check of all the monitor input devices. Replace input devices if necessary.

Keyboard/Mouse not functioning

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Keyboard/Mouse attached directly to the monitor not functioning	Keyboard/Mouse not connected properly	Check cabling
	Keyboard/Mouse defective	Replace Keyboard/Mouse
	PS/2 I/O board in wrong slot	Check I/O Matrix in "Theory of Operation"
	PS/2 I/O Board defective	replace I/O board
Keyboard/Mouse attached to Remote Extension Box not functioning	Remote Extension Box is not connected to the monitor or Input Device is not connected to Remote Extension Box	Check cabling and connections
	Keyboard/Mouse defective	Replace Keyboard/Mouse
	Remote Extension Device defective	Replace Remote Extension Device
	Remote Device I/O board in wrong slot	Check I/O Matrix in *Theory of Operation*
	Remote Device I/O board defective	Replace I/O board

Battery related problems

Symptoms	Causes of Failure	Failure Isolation and Remedy
Battery symbol is not displayed	The monitor is not configured for battery operation.	Make sure a battery board is installed.
BATTERIES EMPTY or **BATT 1/BATT 2 EMPTY** INOP tone, battery LED flashes During this INOP, alarms cannot be paused or switched off.	The estimated remaining battery-powered operating time of the indicated battery or batteries is less than 10 minutes.	Insert full batteries or recharge the batteries immediately. If the condition persists, this INOP is re-issued two minutes after you acknowledge it.
BATTERIES INCOMPAT or **BATT 1/BATT 2 INCOMPAT** INOP tone	The indicated batteries cannot be used with this monitor.	Replace with the correct batteries (M4605A).
	Communication problem between battery and battery board.	Check batteries in a different monitor. If INOP persists replace batteries.
		Check battery board using known good batteries. If INOP persist, replace battery board.
BATTERIES LOW or **BATT 1/BATT 2 LOW** INOP tone	The estimated battery-powered operating time remaining is less than 20 minutes.	Insert full batteries or recharge the batteries.

Symptoms	Causes of Failure	Failure Isolation and Remedy
BATTERIES MALF or **BATT 1/BATT 2 MALFUNCTION** INOP tone, battery LED flashes During this INOP, alarms cannot be paused or switched off if the monitor is not connected to mains power.	The monitor cannot determine the battery status or there is a communication problem between the battery and the battery board.	Replace the faulty battery or batteries. If the condition persists and the monitor is not connected to AC power, this INOP is re-issued two minutes after you acknowledge it. Check the batteries in a different monitor or in a battery charger. If the INOP persists the battery is faulty. Check the battery board with known good batteries. If the INOP persists, replace battery board..
BATT1/BATT2 MISSING During this INOP, alarms cannot be paused or switched off.	The monitor requires two batteries but can detect only one battery.	Insert the missing battery immediately.
CHARGER MALFUNCT INOP tone, battery LED may flash	There is a problem with the battery charger in the monitor.	Switch the monitor off and back on again. If the problem persists replace batteries with known good batteries. If the INOP is shown again replace the battery board. If the problem persists replace the main board.
CHECK BATT TEMP INOP tone	The temperature of one or both batteries is too high.	Check that ventilation openings are not blocked and monitor is not exposed to heat.
CHARGE BATT1/ BATT2 INOP tone	Battery is deeply discharged and/or does not communicate and requires pre-charging.	Connect the monitor to AC power or place battery in external charger.

Bedside Network Status Icons

The following table shows the icons displayed on the monitor when network related issues occur.

Wireless Icon	Wired Icon	Inverse Video	Blinks	Icon Comments	Inop Message	What does it mean?
No Icon	No Icon	-	-	-	-	MONITOR does not have a LAN connection (Wireless MONITOR cannot find an access point to talk to, wired MONITOR cannot hear anything on its LAN connection)
		Yes	Yes	Central - outline only	"UNSUPPORTED LAN" (after 1 minute)	MONITOR ha a LAN connection but does not have an IP address assignment (Wireless MONITOR has found an access point to talk to, wired MONITOR hears traffic on the LAN)
		No	No	Central - outline only	"NO CENTRAL MONITORING"	MONITOR is connected to the LAN and has an IP address assignment, but the bed is not being monitored at the central 1. MONITOR is not assigned to a sector 2. There is another monitor on the network with the same "Equipment Label"
		No	No	Central - solid box	-	Normal Operation - MONITOR assigned to a sector and is being monitored by a central
-		No	No	Central - solid box, network line extended	-	Normal Operation - MONITOR assigned to a sector and is being monitored by a central This monitor also has OVERVIEW functionality on other beds
	-	No	Yes	Central - solid box	"WIRELESS OUT OF RANGE"	Wireless MONITOR that currently is being monitored by a central is losing contact with the access point and cannot find another to talk to
		Yes	Yes	Central - outline only, line for broken connection to central	"NO CENTRAL MONITORING"	Monitor lost connection to the Information Center: 1. LAN cable was disconnected 2. Information Center was disconnected 3. Network infrastructure failure (switch, etc.) 4. Out of range (wireless MONITOR)

Network related problems

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Prompt Message "no central assigned to this bed" is issued	The monitor label is not set in the monitor (if the beds are "monitor labeled" in the Philips Information Center)	Set Monitor Label in Config Mode
	Problem with the Philips Information Center to Switch communication (if the beds are "port mapped" in the Philips Information center	Check PIC to Switch communication, Switch configuration and Firmware status
INOP "Unsupported LAN" is issued.	Network failure	Check if switches, Philips Information Center and Database Server are all running and connected to the network
	Monitor connected to wrong network	Check if monitor has been connected for example to a different hospital network instead of the Philips Clinical Network
	IP address conflict after infrastructure re-installation	Reboot Database Server and Philips Information Center

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
No connectivity to PIC, no prompt or error message on monitor	Hardware Defect	Check LAN cable connection
		Check System Interface board in Monitor
		Check Switch
	Configuration problem	Check switch configuration and firmware revision
Other Bed Overview not available	Configuration Problem	Check configuration in PIC regarding other bed overview (care group assignment)
		Verify configuration of switch (setting of multicast filters)
	This function is not available for wireless beds	Switch to a wired configuration
“Other Bed” Alarms are not appearing	Configuration problem	Verify configuration in PIC, in Monitor (Config Mode) and check that the feature is not temporarily disabled by the user (Bed Info Window)

Wireless Ethernet Adapter (Proxim)

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
No central monitoring possible (see also Network related problems)	Monitor is out of range of the access point (in this case the yellow sync LED on the wireless adapter on the bottom of the device next to the power connector is not on steady)	Move monitor back into coverage area
		Verify size of coverage with the site survey tool
	Wireless Adapter has no power (LEDs on adapter are all off)	Check splitter cable and replace if necessary
		Check network adapter board in monitor and replace if necessary
		Check adapter itself. Replace if necessary
	(Only after first install) Firmware revision in adapter is wrong	Update adapter frimware with wireless support tool
	Wireless adapter defective (the red status LED on the adapter’s top panel is on)	Replace wireless adapter
	Wrong configuration in wireless adapter or in access point	Check configuration with wireless support tool
No connectivity (coverage area consists of multiple access points and in some parts of the area there is no connectivity)	Configuration problem	Verify the channel, domain and security ID settings of the access points in the coverage area

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Frequent dropouts and network disconnects	Excessive interference by other radio equipment or by microwave ovens	Check statistics that can be read from the wireless adapter via RS232 or via logging application in the PIC. Remove interfering equipment.
	System capacity exceeded in coverage area	Check configuration guidelines for number of monitors per access point.
	Configuration problem	Check access point configuration with wireless support tool, in particular the multicast filters
Overview, Printing does not work	Some functions are not available on a wireless network	Connect to cabled network

IIT-related Problems

Symptoms	Cause of Failure	Failure Isolation and Remedy
No Network icon or Network icon flashes. No association to central station.	Communication problem between the monitor and the IIT adapter. MAC Instr. Tele. field in Instrument Telemetry Service Window is 0000 0000 0000	Check that RF Access Code is set correctly and the network is correctly set up. Check the Y-cable connection and the PCA adapter board connection. Check the antenna cable connection between the IIT module and the antenna. Replace Y-cable, PCA adapter board, antenna or IIT module if necessary.
	Incorrect RF Access Code. No IP Address.	Check that RF Access Code is set correctly. Make sure that network is set up correctly.

IntelliVue 802.11 Bedside Adapter Problems

Symptoms	Cause of Failure	Failure Isolation and Remedy
No Network icon or Network icon flashes. No association to central station.	Communication problem between the monitor and the IntelliVue 802.11 Bedside Adapter or RSSI value below 30.	Ensure that the network infrastructure is functioning properly. See Troubleshooting tables in the IntelliVue 802.11 a/g Infrastructure Installation and Configuration Guide for details. Check the antenna cable connection on the IntelliVue 802.11 Bedside Adapter. Check the cable connection between the IntelliVue 802.11 Bedside Adapter and the system interface board. Replace cable, antenna or IntelliVue 802.11 Bedside Adapter if necessary.
	Configuration problem.	Make sure that the Mode, SSID, Country and Security settings in the Setup WLAN menu match your installation
LEDs on IntelliVue 802.11 Bedside Adapter are off and remain off	Communication problem	Check that the cable connection from the IntelliVue 802.11 Bedside Adapter to the system interface board is correct. Disconnect and reconnect the cable and try again. If problem persists, switch monitor off and on again. If problem persists, exchange cable and or IntelliVue 802.11 Bedside Adapter. If the new adapter does not function either, exchange system interface board. When functioning correctly, The LEDs on the bedside adapter should both light up for about 3 seconds after the monitor is switched on or the bedisde adapter is first connected via the network cable. If the wireless LAN functionality has been disabled permanently both LEDs will remain off during monitor operation. In this case, to check the electrical connection, power-cycle the monitor and observe the LEDs on the adapter.

Multi-Measurement Server

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Prompt message "Measurement Server Configuration not supported" is issued	An unsupported Measurement Server Extension has been connected	Disconnect the measurement server extension
	Measurement Server Extension is defective	Replace Measurement Server Extension
	Measurement Server defective	Replace Measurement Server
INOP Message "MsmtSrv not Supp" is issued	Wrong Software Revison	Upgrade monitor and/or measurement server to a matching software version. Refer to "Software Compatibility Matrix" for a list of compatible measurement servers.
	Too many measurement servers connected	Disconnect unsupported measurement servers for proper operation.
	Unsupported type of measurement server (for example M3000A on a M800xA monitor) connected.	Disconnect the unsupported measurement server. Refer to "Software Compatibility Matrix" for a list of compatible measurement servers.
Prompt message "Measurement Server not supported, unplug device, switch monitor off/on" and INOP "Bad Measurement Server are issued	M3000A Measurement Server Revision A is plugged. This Measurement Server is not compatible with the IntelliVue patient monitors	Disconnect the measurement server and cycle power.

MSL-related problems

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Measurement Server does not start up (no LEDs active), no INOP or prompt displayed	No Power	Check MSL cable and replace if necessary
		Check MSL connector board incl. internal cable to main board and replace if necessary
Measurement Server does not start but LEDs are normal	Communication lines in MSL cable or MSL connector broken	Check MSL cable and MSL connectors
	MSL connector board defective	Check MSL connector board incl. internal cable to main board and replace if necessary
	System Interface Board is not connected	Check System Interface Board connection to Main Board

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
MSL Power High INOP is issued Note: if this condition persists for longer than 15 minutes, the INOP MSL Power Off will appear (see below)	Attached devices drawing too much power from the monitor.	MMS or cable defective. Check MSL cable and replace if necessary.
MSL Power Off INOP is issued	Attached devices drawing too much power from the monitor.	Disconnect all MMS from the monitor Cycle power to restore power to the MSL devices. If the message disappears, reconnect MMS , waiting 15 minutes to see if message reoccurs. If yes, the respective MMS is faulty. See Multi-Measurement Server or Printer for troubleshooting tasks. Note: If an individual defective device is connected the MSL Power High or MSL Power Overload INOPs will appear initially. The MSL Power Off INOP will not occur for at least 15 minutes.
MSL Power Overload INOP is issued	Short Circuit within MSL system	Disconnect MSL connection and reconnect device. If message persists, remove the MSL connector board incl. internal cable to main board. If message persists, replace main board.
INOP BAD SERVER LINK is issued	Unexpected data detected on MSL	Check cable and power cycle the monitor
	An MMS with an incompatible software revision is connected to the monitor.	Connect MMS with compatible software revsion
	Communication between the components not functioning	Check software versions and model number of devices for compatibility
INOP Message SERVERLINK MALF is displayed, audible indicator: a beep every two seconds	The hardware for communicating with the Multi-Measurement Server is faulty.	Check MSL cable, replace if necessary.
		Check MMS connector board. Replace if necessary.

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
A measurement supported by a server does not come up on the monitor	Label conflict	A parameter label from this measurement is already in use in the monitor. Check the conflict window to select the measurement.
Prompt message “Too many <label> modules connected” is issued	There are more modules of the type <label> connected than supported by the software	Remove the unsupported module or use the lebel manager application in the monitor to disable the module.
The ECG Out/ Marker In function does not funcion	Hardware problem	Check MSL cable
		Check ECG Out Hardware in the monitor
		Check the MSL connector in the measurement server

Alarm Issues

Alarm Lamps

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
INOP Message Check Alarm Lamps is issued	ECG Out/Alarm LED board cable disconnected	reconnect ECG Out/Alarm LED board to mainboard
	ECG Out/Alarm LED board defective	replace ECG Out/Alarm LED board
	Main board defective	replace Main board
Alarm occurs, but no LED lights up	Environmental lighting too bright	Place monitor in a darker environment
	ECG Out/Alarm LED board cable disconnected	reconnect ECG Out/Alarm LED board to mainboard
	Alarm LED board defective	Replace ECG Out/Alarm LED board
	Main Board defective	Main board

Alarm Tones

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
INOP Message SPEAKER MALFUNCTION is displayed	Speaker cable disconnected	Reconnect speaker cable
	Speaker defective	Replace speaker
	Sound amplifier on main board defective	Replace main board

Symptoms	Possible Causes of Failure	Failure Isolation and Remedy
Alarm occurs but no alarm sound is issued	Audible alarm indicators have been switched off	Switch audible alarm indicators back on
	Volume set to 0	Increase volume
	Speaker defective	Replace speaker
	Sound amplifier on main board defective	Replace main board
Alarm occurs on device connected to VueLink but no alarm sound is issued on the monitor	Configuration of VueLink is incorrect	Check VueLink configuration

Alarm Behavior

If your monitor did not alarm in the way in which the end user expected, please consult the Instructions for Use for possible setup issues or configuration settings which could affect alarm behavior.

Individual Parameter INOPS

If any of the following parameter INOP messages are issued try the respective parameter in another device. If the INOP message persists replace the parameter module, the MMS or other indicated device.

- CO_2 EQUIP MALF
- ECG EQUIP MALF
- NBP EQUIP MALF
- <Pressure Label> EQUIP MALF
- RESP EQUIP MALF
- SpO_2 EQUIP MALF
- SpO_2 TRANSDUC MALF
- SvO_2 EQUIP MALF
- $tcpO_2$ (or $tcpCO_2$) EQUIP MALF
- <Temp Label> EQUIP MALF
- VueLnk EQU. MALF
- BIS EQUIP MALF
- EEG EQUIP MALF

Integrated 4-Slot Rack

Symptoms	Cause of Failure	Failure Isolation and Remedy
Prompt Message "Unrecognized Measurement Module in slot m" is issued	An unsupported module has been plugged into the Integrated Module Slot	Unplug the unsupported module.
Prompt message "Measurement Module in slot n is currently ignored" is issued	Too many modules of the same kind have been plugged into the Integrated Module Slot	Unplug module in slot n
Inserted Module LEDs behave normally but Modules not recognized by monitor	The monitor software version does not support measurement modules	Check software version and options
	Label conflict	See MSL-related problems
Inserted Module does not function	Connector damaged	Replace integrated module slot
	internal connection defective	Replace integrated module slot.

Printer

Symptoms	Cause of Failure	Failure Isolation and Remedy
Prompt message "Print job could not be queued" is issued. No print device is found.	Printer is disabled in the Setup Printers menu	Enable the correct printer in the Setup Printers menu
	Paper size of printer does not match paper size of report	Change paper size of the printer in the Setup Printers menu or change paper size of the report in the Setup Reports menu.
Status message "Print device Local 1 (Local 2) unavailable" is issued. Printer job is stalled.	Printer not switched on	Switch on printer power
	Printer paper tray empty	fill printer paper tray
	Cabling not connected correctly	Check cabling
	I/O board defect	replace I/O board
Status message "Print device Remote 1 (Remote 2, Remote 3) unavailable" is issued. Printer job is stalled	Print error on Philips Information Center	Print a test report on the Philips Information center. If this fails, refer to Philips Information Center documentation
	Network Connection to Philips Information Center not functioning	Check that the network connection between the monitor and the Philips Information Center is working

Symptoms	Cause of Failure	Failure Isolation and Remedy
Status message “Printing on device Remote 1... (Remote 2, Remote 3)” is issued but no report is printed	Print queue on Philips Information Center is full. Reasons for this may be: - Printer is not switched on - Printer paper tray is empty	Switch on printer power Fill printer paper tray
Printouts are not as expected	Printer paper size is not correctly configured Printer resolution is not correctly configured Printer color support is configured to “On” although the printer does not support color Printer not compatible	Configure the paper size according to the inserted print media Configure the printer resolution according to the printer capabilities Configure the printer color support to “Off” Check specifications

Recorder

Symptom	Possible Cause	Corrective Action
System thinks that door is open when it is not.	Defective door switch.	Replace door switch. Exchange module.
System thinks that the recorder is out of paper when it is not.	Paper-out sensor dirty.	Clean paper-out sensor.
Recorder not communicating with System.	Poor connection to the front-end 4-slot rack	Unplug the module. Plug it back in and try it again in a few seconds. (Watch for the LED to flash.)
	Only one recorder module may be used with each monitor.	Remove one of the recorder modules.
	System not configured properly.	Check the configuration of the connected monitor.
	Too many modules connected.	Check and remove the extra modules.
Recorder won't run.	Recorder interface not working correctly.	Unplug the module. Plug it back in and try it again in a few seconds. (Watch for the LED to flash.)
Poor print quality.	Printhead dirty.	Clean the Printhead.
	Printhead failure.	Exchange the module.
Paper not feeding properly.	Paper roll off center.	Center paper roll on roller guides.
	Dirty roller.	Clean roller.
Module does not lock into 4-slot rack .	Locking plates defective.	Remove and exchange the locking plates.

MIB / RS232

Symptoms	Cause of Failure	Failure Isolation and Remedy
AGM connected to an RS232 port not functioning	The MIB/RS232 port is not configured for AGM	Check configuration of the MIB/RS232 ports in configuration mode
	The cable between AGM and monitor is not connected correctly or defective	Check cable connection, replace cable if necessary
	The MIB/RS232 board is in a wrong slot (slot has been changed after software configuration or an additional board has been plugged in)	Verify correct placement of the I/O boards
	The MIB/RS232 board is defective	Check board and replace if necessary
External device not receiving data	The MIB/RS232 port is not configured for data export	Check configuration of the MIB/RS232 ports in configuration mode
	The wrong data export protocol driver is configured in the monitor	Check the export protocol required by the attached device and configure the monitor accordingly
	The cable between the external device and the monitor is not connected correctly or defective	Check cable and replace if necessary
	The external device does not support the version of the data export protocol used in the monitor	Check if the device supports the version of the data export protocol. Upgrade device or monitor if necessary (if matching versions exist).
	A terminal concentrator is used in between the device and the monitor and a protocol with dynamic speed negotiation is used	Some terminal concentrators do not support changing the transmission speed (baud rate) dynamically. Check if the connection works without the concentrator
	The MIB/RS232 board is in a wrong slot (slot has been changed after software configuration or an additional board has been plugged in)	Verify correct placement of the I/O boards
	The MIB/RS232 board is defective	Check board and replace if necessary
Detailed Protocol Problem		Consult the Data Export Protocol document.

Flexible Nurse Call Relay

Symptoms	Cause of Failure	Failure Isolation and Remedy
INOP message CHECK NURSE CALL RELAY is issued	Nurse Call Relay board defective	Replace Nurse Call Relay I/O board.
Monitor alarmed, Nurse Call did not activate	Incorrect configuration (Relay latency, Relay trigger)	Check monitor configuration (see configuration guide)
	Connection of cable to monitor or nurse call system not correct	Check cable connections
	Nurse Call Relay board is in the wrong slot.	Verify correct placement of the I/O boards
	The Nurse Call Relay board is defective	Replace Nurse Call Relay board

Basic Nurse Call Relay

Symptoms	Cause of Failure	Failure Isolation and Remedy
Monitor alarmed, Nurse Call did not activate	Incorrect configuration (Relay latency, Relay trigger)	Check monitor configuration (see configuration guide)
	Connection of cable to monitor or nurse call system not correct	Check cable connections
	Advanced system interface board is in the wrong slot.	Verify correct placement of the System Interface board
	The advanced system interface board is defective	Replaceadvanced system interface board

Troubleshooting the ECG OUT/Alarm LED

Symptoms	Cause of Failure	Failure Isolation and Remedy
No ECG-OUT signal to the Defib		Disconnect the MMS and Defib cable. Switch the Monitor off then on again. Observe the red LED in the ECG OUT section. (Note that the LED can only be observed if the housing bottom is removed).
Internal Electronic Defects: The red LED does not switch on for about 1 second at power on:	Cabling not connected	Check cabling
	ECG OUT/Alarm LED board defective	Replace ECG OUT/Alarm LED board

Symptoms	Cause of Failure	Failure Isolation and Remedy
The red LED switches on and remains on for more than 20 seconds:	ECG OUT/Alarm LED Board defective	Replace ECG OUT/Alarm LED Board
	Main Board defective	Replace Main Board
External Electronic Defects	ECG OUT/Alarm LED board defective	Connect Known good Defib, Defib cable MMS and MMS cable. Check Marker pulse and ECG OUT signal at defib again. **If there is still no signal:** Replace ECG OUT/Alarm LED board
	Main Board defective	Replace main board
No marker pulse is displayed on the monitor	Defib does not send marker	Check whether defib is able to send marker or check for internal electronic defects.

Docking Station Problems

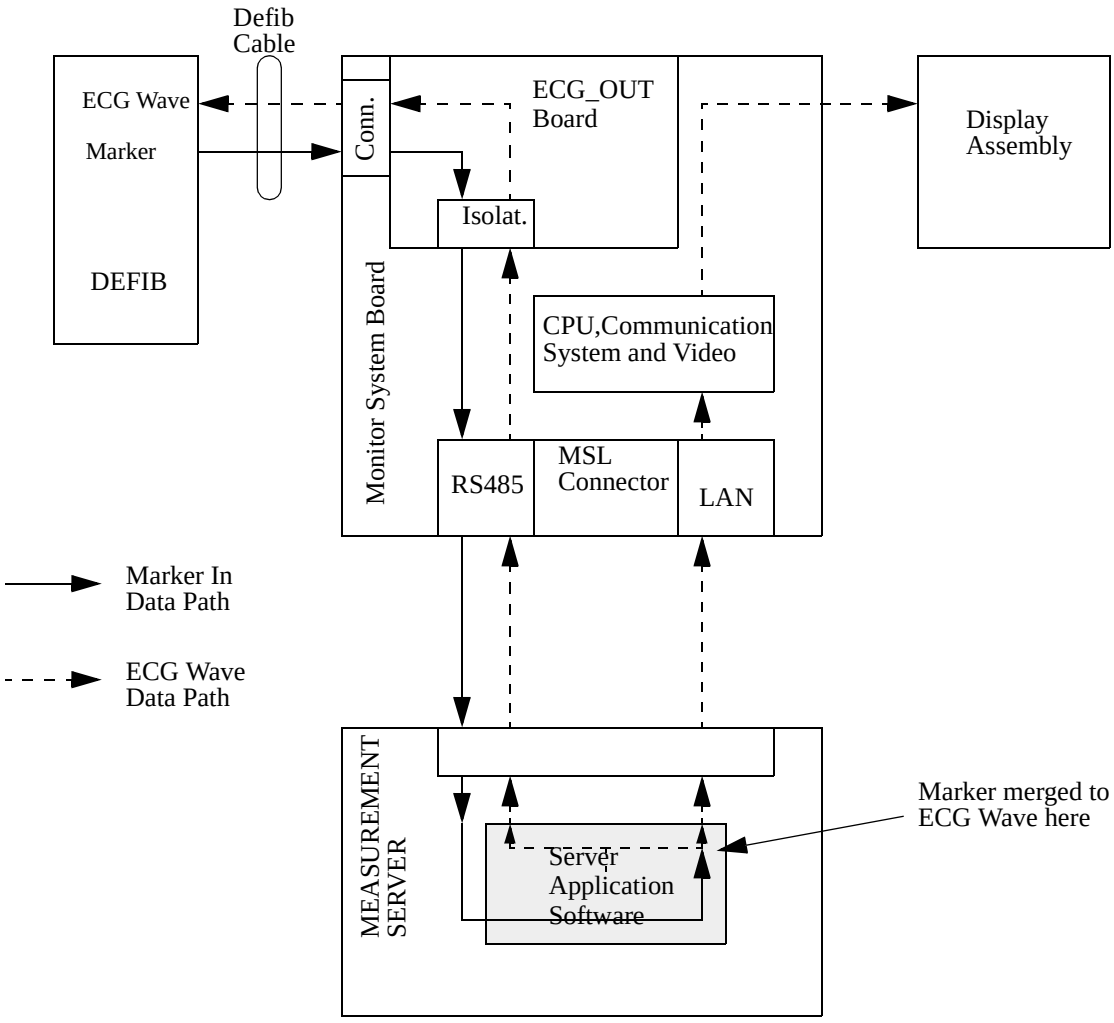
NOTE Before checking for further problems, make sure that the monitor is properly and firmly inserted into the docking station (indicated by a click).

Symptoms	Cause of Failure	Failure Isolation and Remedy
AC LED on Docking Station does not light up	AC connection not ok	Check that the AC-Mains are powered and the power cord is properly connected.
	Docking Station or Docking System Interface board defective	Exchange the docking system interface board or the docking station.
AC LED on Docking Station lights up but AC LED on monitor does not.	Monitor not docked correctly	Check whether the lever is in the right-hand position.
		Check if the monitor AC LED lights up when the monitor is connected directly to AC mains. If yes;
	Docking Station defective	Exchange Docking Station
Monitor cannot be properly docked to the docking station	Docking interface board not correctly installed in the monitor	Make sure that docking interface board is installed in the monitor

Symptoms	Cause of Failure	Failure Isolation and Remedy
Monitor in docking station has AC Power but network connection could not be established	Docking interface board not installed in monitor	Make sure that docking interface board is installed in the monitor
	LAN cable not connected or defective	Check the LAN cable connection. Try the LAN cable directly in the monitor. If it functions in the monitor but not in the docking station, see other possible causes below. If it doesn't function in the monitor, exchange the LAN cable
	Flex cable in docking station not connected properly or defective	Check the flex cable connection in the docking station. Exchange flex cable if necessary.
	Docking Station main board defective	Exchange docking station main board
	Other network related problems.	See *Network related problems*
Monitor does not boot or constantly reboots but functions properly outside docking station	Flex cable in docking station not connected properly or defective	Check the flex cable connection in the docking station. Exchange flex cable if necessary.
	Docking Connector soiled or blocked.	Make sure there is no dirt or other foreign bodies in the docking connectors
	Docking Station main board defective	Exchange docking station main board

Data Flow Marker In and ECG Wave

The following illustration of the data flow for Marker In and ECG Wave may assist in troubleshooting.



Status Log

Many events that occur during start-up or regular monitoring are logged in the Status Log. The Status Log can be printed and cleared. Not all entries in the Status Log are errors.

Monitor				
H	1720	20050	1	4 Apr 02 16:37
C	1721	21050	1	4 Apr 02 15:37

The window title is either **Monitor** or **MeasServ**, dependent on which system component's status log is currently displayed.

The Status Log window shows logged events which caused a reboot of the system component (monitor or measurement server).

To enter the Status Log Window, select Main Setup -> Revision. The following list opens up:

- **Status Log**
- **Product**
- **Appl. SW**
- **Config**
- **Boot**
- **Language**

Select **Status Log.**

The first column in the log identifies the event class ("C": caused a cold start, "H": caused a hot start, "N": no retstart, for information only). Column 3 and 4 identify the event source and event code. Column 4 counts the number of occurrences of the event. The last column shows the time and date of the last occurrence of the event.

The following pop-up keys overlay the SmartKeys:



Clear StatLog

This key clears the currently displayed Status Log

M8003 or M8004

This key switches to the Monitor Revision Window

M3001

This key switches to the Multi Measurement Server (MMS) Revision Window

If an event occurs repeatedly, contact your Philips Service Representative.

NOTE It is possible, using the support tool, to download the status log and send it to your Philips Service Representative as a file (for example via e-mail).

List of Error Codes

There are no error codes at this point.

Troubleshooting with the Support Tool

Using the support tool you can:

- access the full status log which can be saved as a file
- reload software
- identify defective devices
- reset touch screen calibration

For details on how to perform these tasks see the Support Tool User Manual.

Troubleshooting the Individual Measurements or Applications

For problems isolated to an individual parameter or application such as event review, please consult the Instructions for Use and configuration information.

If the instructions for use did not resolve an individual parameter problem, then another module or measurement server should be tried.

If you are getting questionable readings for individual measurements you may want to do the Performance Verification tests in the *Testing and Maintenance* section.

The performance of the individual applications (event review, arrhythmia, trending) are affected by the configuration of the monitor. When contacting Philips support you may be asked about the configuration of the monitor to aid in troubleshooting.

5

Repair and Disassembly

The following section describes the disassembly and reassembly procedures for the monitor and its components to the extent required to remove and replace faulty assemblies. Do not further disassemble the product past the point described in these procedures.

WARNING High Voltage - Voltages dangerous to life are present in the instrument. Do not perform any disassembly or reassembly procedures (other than MMS, MMS extension or parameter module removal) with power applied to the instrument. Failure to adhere to this warning could cause serious injury or death.

Before doing any disassembly, turn power off, disconnect the Local Distribution Cable, **AC power cable**, MSL cable, Defib sync' cable and RS232 cable (where appropriate), disconnect the MMS and remove **batteries**.

Tools Required

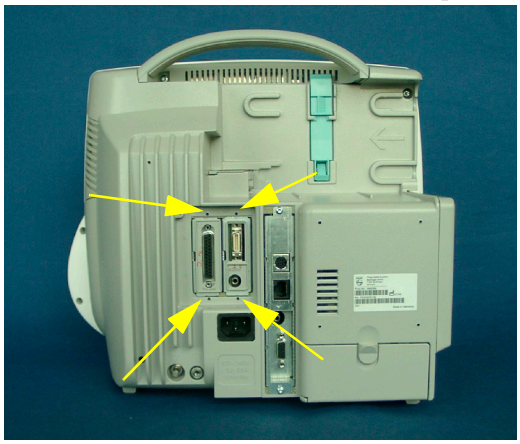
- Torx screwdrivers (sizes 10,20)
- Ph00 cross-tipped Screwdriver
- 4 mm Allen Wrench
- Socket Wrench
- 5.0 Hexagon Socket
- M6 Screw Wrench
- SPH size 1 cross-tipped Screwdriver
- 2 Small flat head screwdrivers
- Needle Nose Pliars
- ESD mat and wrist strap
- 1 small Pozi or Philips head screwdriver
- Cleaning Agent

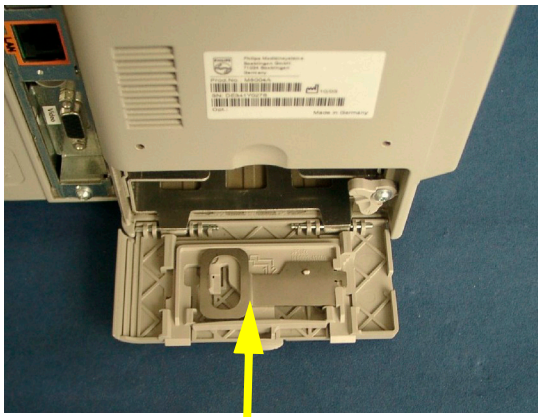
Recommended cleaning agents are:

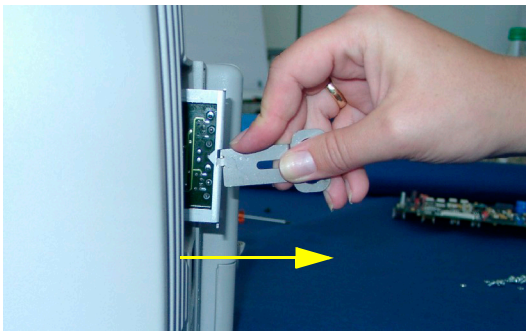
Tensides (dishwasher detergents)	Edisonite Schnellreiniger®, Alconox®
Ammonias	Dilution of Ammonia <3%, Window cleaner
Alcohol	Ethanol 70%, Isopropanol 70%, Window cleaner

Removing the I/O Boards

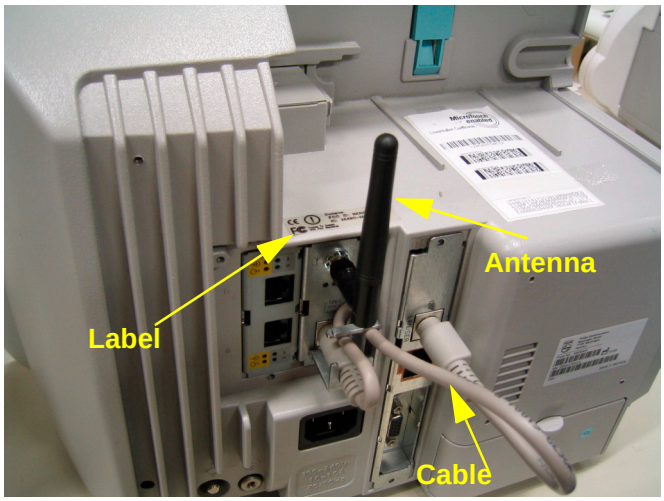
1 Remove the two screws securing each I/O board and then remove the boards using the board removal tool located in the battery compartment







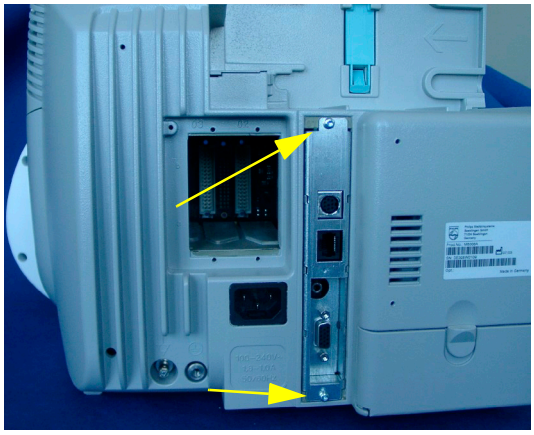
Reassembly Note: If you have installed #J35 (IntelliVue 802.11 Bedside Adapter) please attach the approval label or the WLAN label for Japan (country specific) and the antenna and connect the cable from the 802.11 Bedside Adapter to the wireless port as shown below.

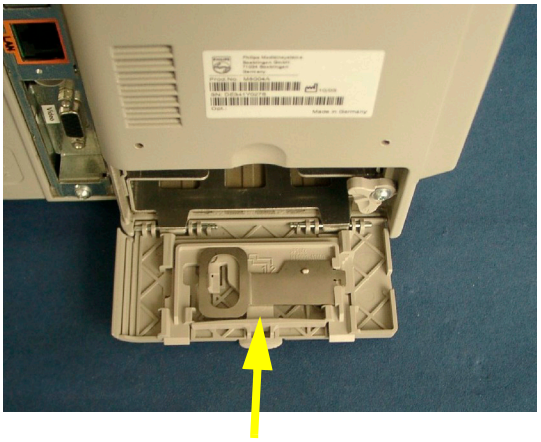


NOTE The installation of #J35 requires an advanced system interface board.

Removing the Interface Board

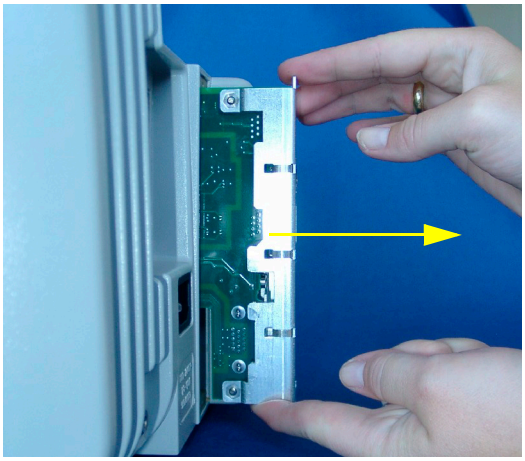
1 Remove the two screws securing the Interface board and then remove the board using the board removal tool located in the battery compartment





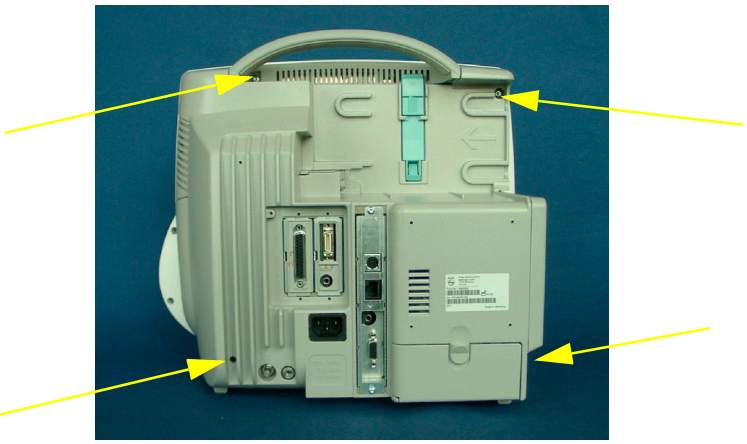
Board Removal Tool





Separating the Front and Back Half of the monitor

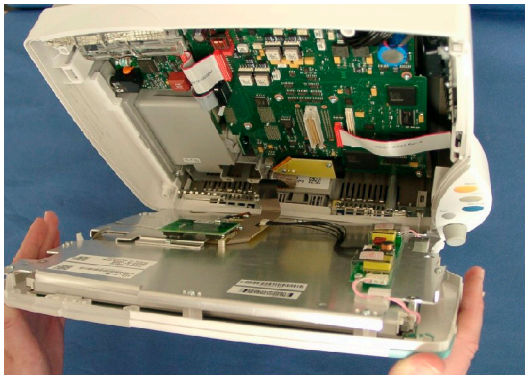
1 Remove the four screws at the back of the monitor, the lower ones first.



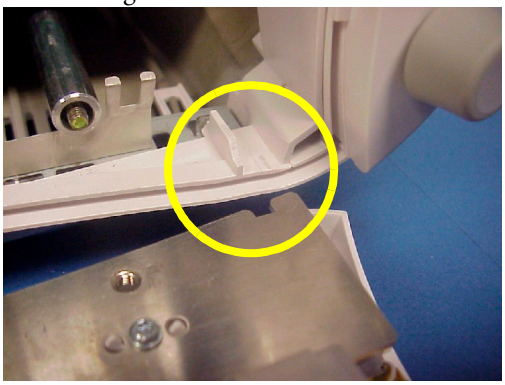
NOTE Hold on to the display when loosening the screws so the display does not fall off.

2 Pull off the front housing. Do not pull the display off completely, only tilt it to the front, because otherwise the flex panel adapter could be damaged.

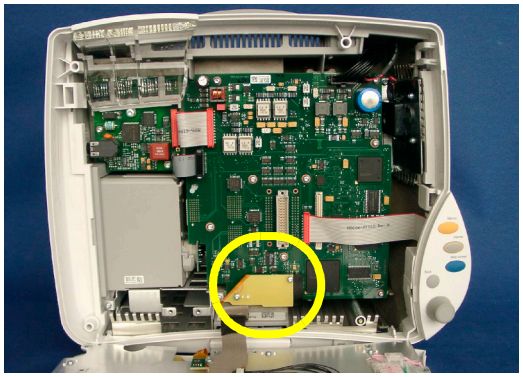


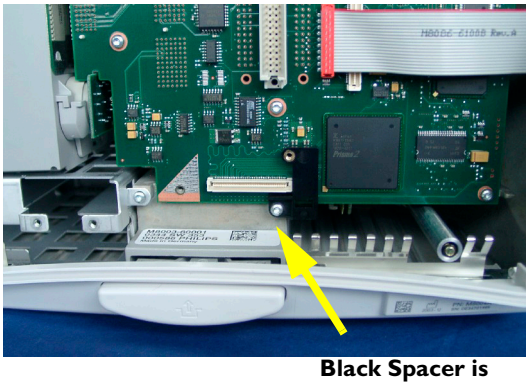


Reassembly Note: Make sure the metal sheet on the back of the display is inserted into the noses of the monitor rear housing when reassembling the two halves.



3 Unscrew the screws holding the flex panel adapter cable and pull off the flex cable carefully towards you.

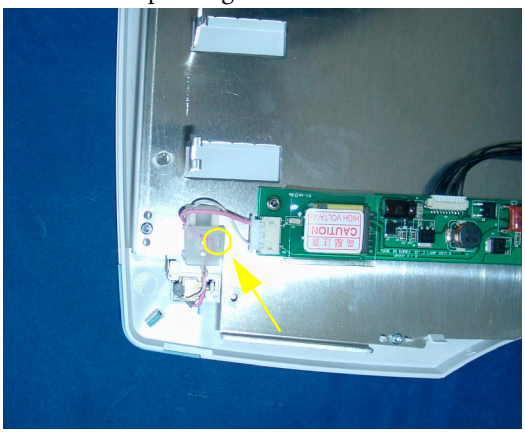


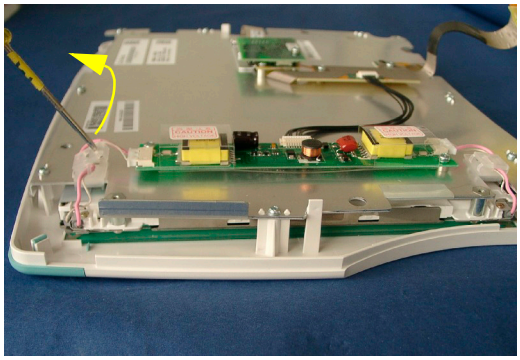


Black Spacer is attached to main board with one screw

Exchanging the Backlight Tubes

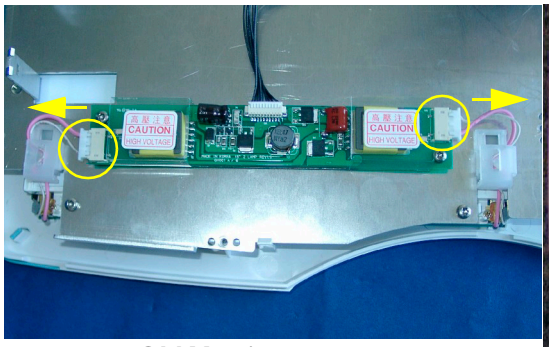
1 Open the backlight tube cable holders by sticking a screwdriver in the small hole at the top of the holder and pushing it backwards.



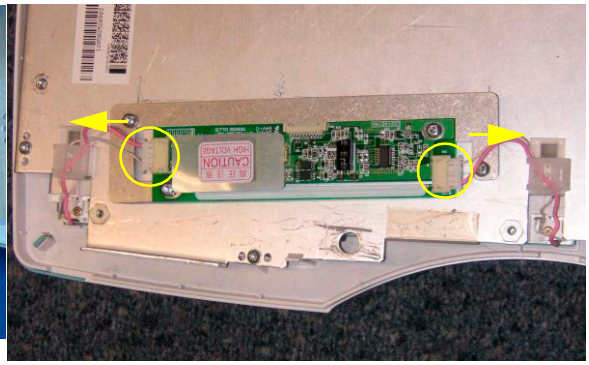


Reassembly Note: Cables must be re-inserted into the plastic cable holder with a slight strain on them towards the backlight tube. The cable holder functions as a strain relief.

2 Unplug the cables from the backlight inverter board



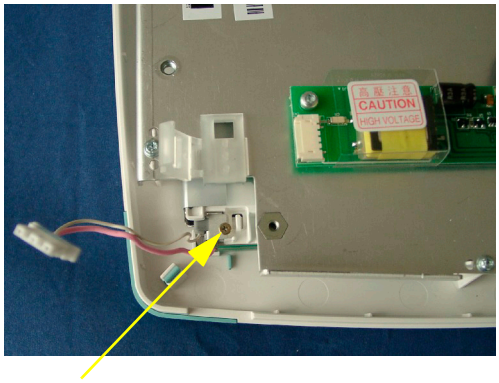
Old Version

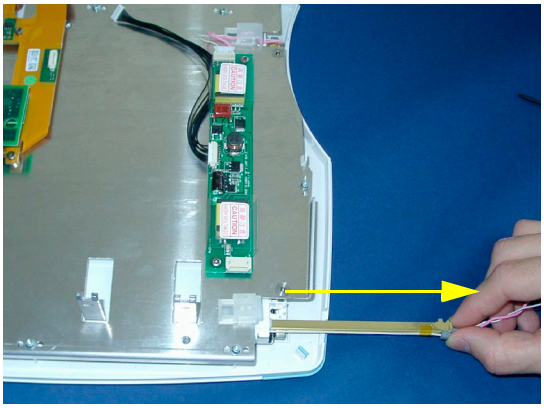


New Version (Backwards Compatible)

Please note that due to its dimensions, the new version of the backlight inverter board is not fixed in a straight position.

3 Unscrew the screws securing the backlight tubes and slide out the backlight tubes.





Removing the Flex Panel Adapter

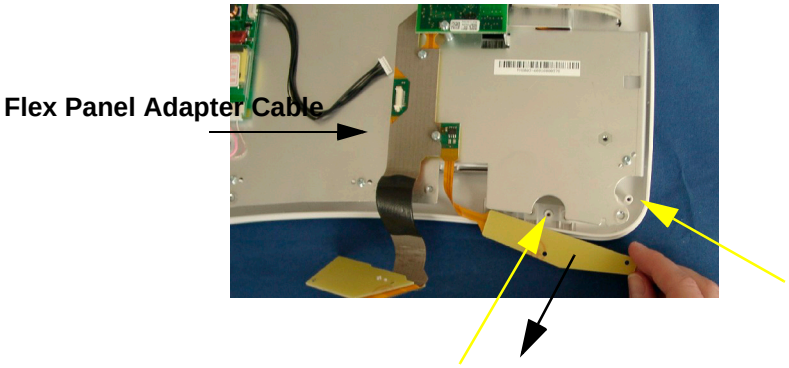
1 Separate the front and back half of the monitor as described above.

2 Unplug the connector to the backlight inverter board.

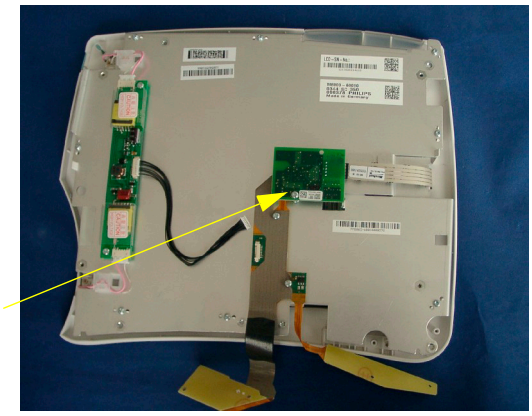


3 Remove the two screws securing the power switch and the LED board and pull out this part of the flex panel adapter cable.

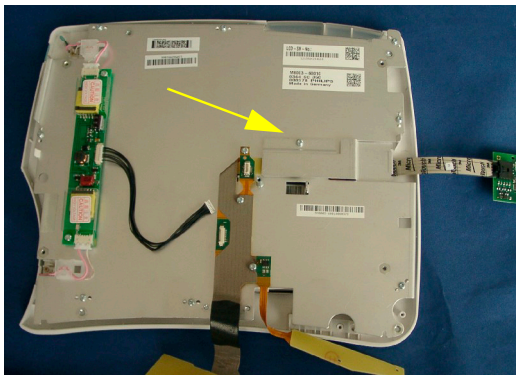
NOTE The screws securing this board are self-cutting - turn in opposite direction first when re-inserting them .



4 Remove one screw and then remove the touch controller board.



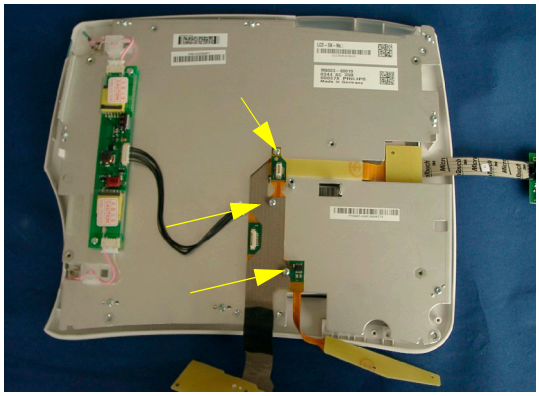
5 Unscrew the screw holding the metal sheet under touch controller board and remove the metal sheet.



6 Slip a screwdriver under the end of the flex panel adapter cable and lift upwards to remove the connector to the display.



7 Unscrew the three screws and remove the flex panel adapter cable.

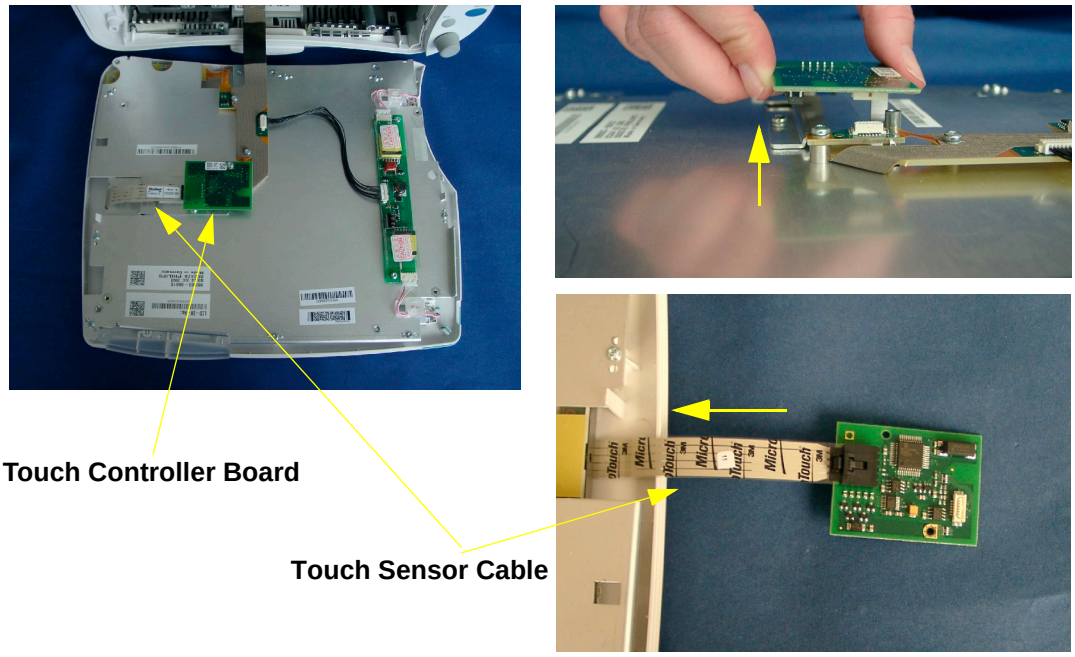


Removing the Touchscreen

1 Separate the front and back half of the monitor as described above.

2 Remove the touch controller board and unplug the touch sensor cable by pressing on the security lock on the connector.

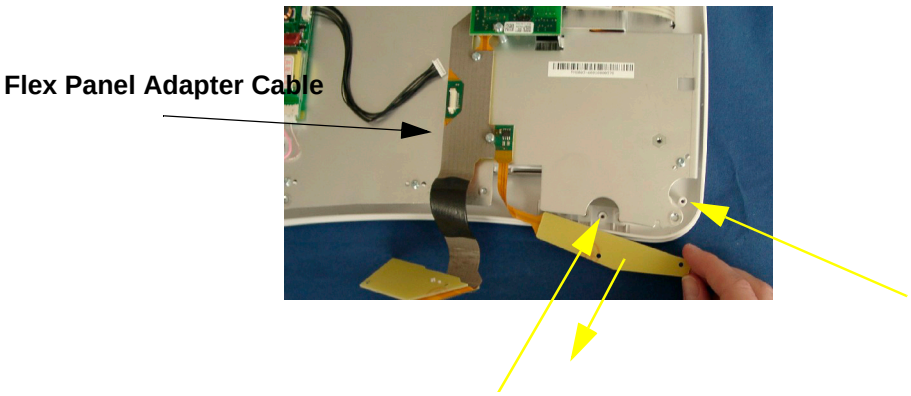
NOTE You must replace the touch panel and the touch controller board together in order for the monitor to function correctly.



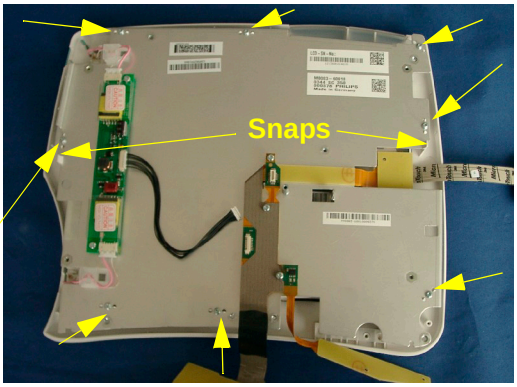
Reassembly Note: Plug the touch sensor cable into the touch controller board first, then re-insert the touch board

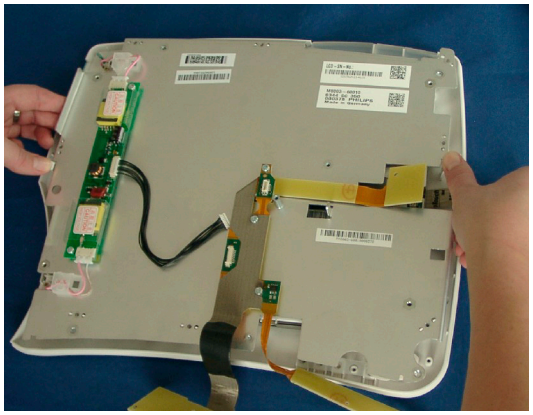
3 Remove the two screws securing the power switch and the LED board and pull out the board. The board and the screws are part of the flex panel adapter cable.

NOTE The screws securing this board are self-cutting - turn in opposite direction first when re-inserting them .



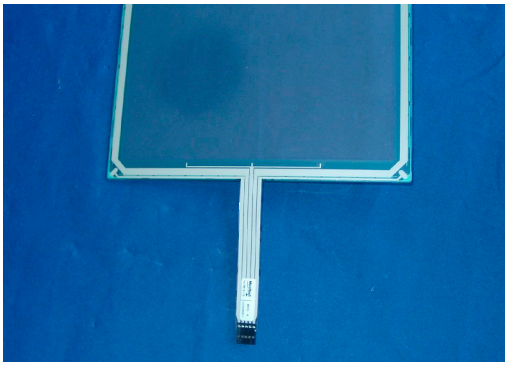
4 Remove the eight screws and carefully lift off the display assembly by releasing the two snaps in the monitor bezel.





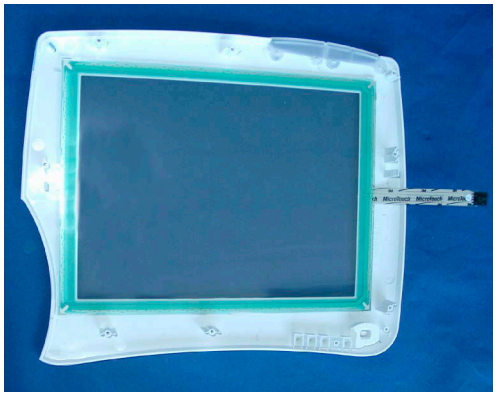
CAUTION We recommend that this procedure is performed in a dust free environment. The display assembly may be hard to remove from the touch panel due to the gasket (adhesive strips) holding the two together.

5 Separate the touch panel (sensor) from the bezel.



NOTE This procedure may be difficult due to the gasket (adhesive strips).

Reassembly note: When looking at the touch panel from the back, the touch sensor cable should point to the right when the touch panel is re-inserted into the monitor housing.

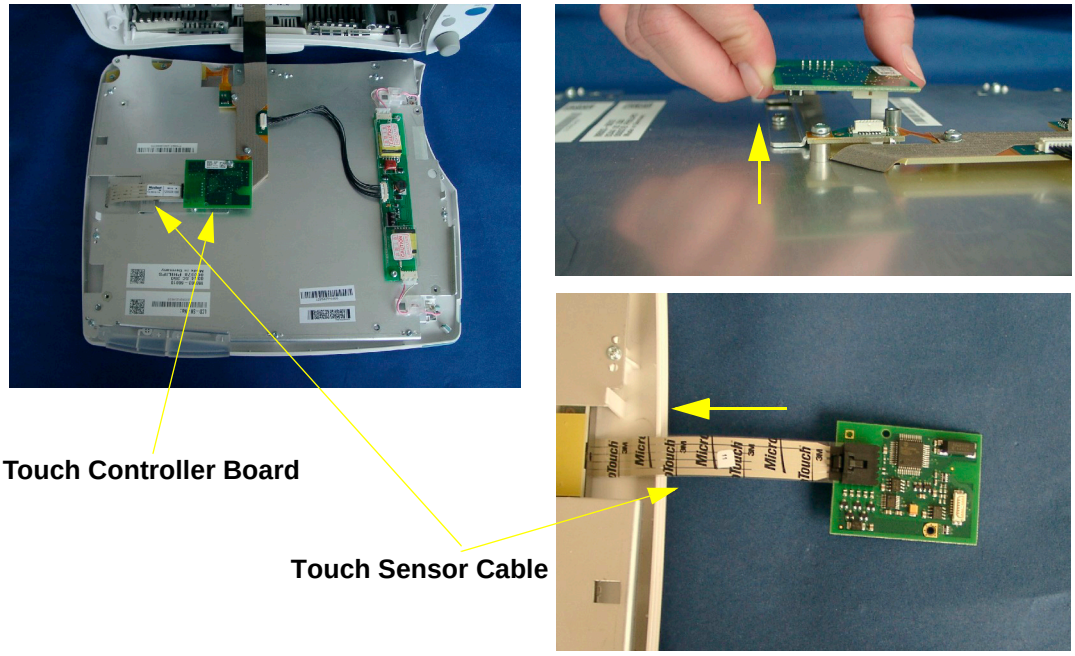


NOTE You must replace the touch panel and the touch controller board together in order for the monitor to function correctly.

Removing the Flat Panel

1 Separate the front and back half of the monitor as described above.

2 Remove the touch controller board.

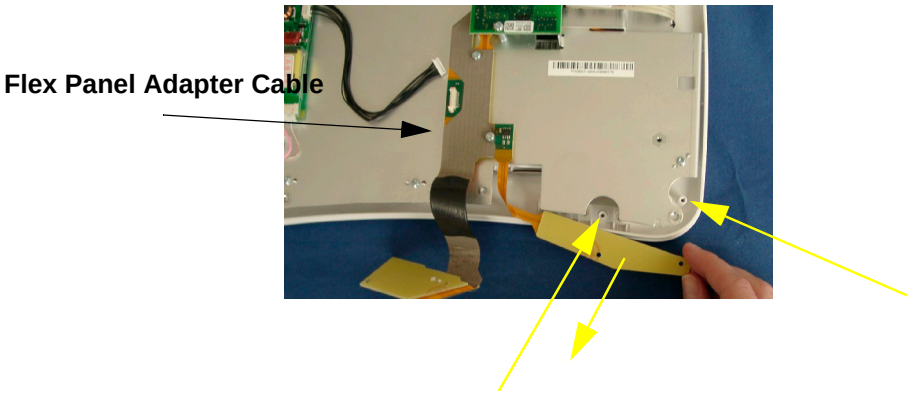


Reassembly Note: Plug the touch sensor cable into the touch controller board first, then re-insert the touch board

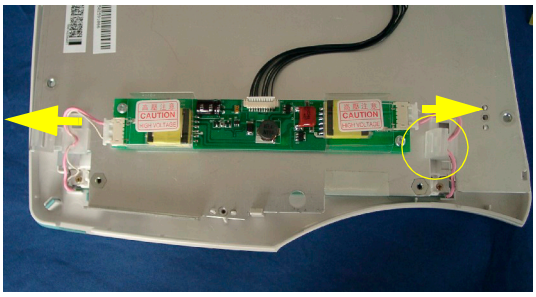
3 Remove the two screws securing the power switch and the LED board and pull out the board. The board and the screws are part of the flex panel adapter cable.

Reassembly Note: The screws securing this board are self-cutting - turn in opposite direction first when re-inserting them

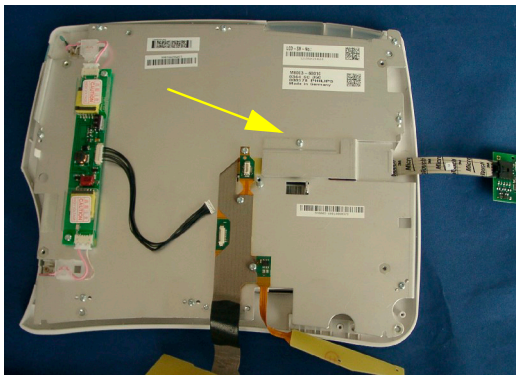
.



4 Unplug the backlight tube cables and release them from the strain relief cable holders.



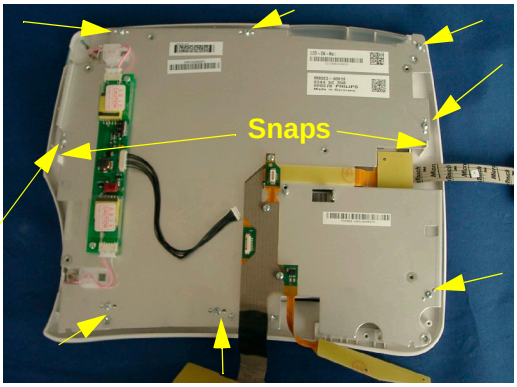
5 Unscrew the screw holding the metal sheet under touch controller board and remove the metal sheet.

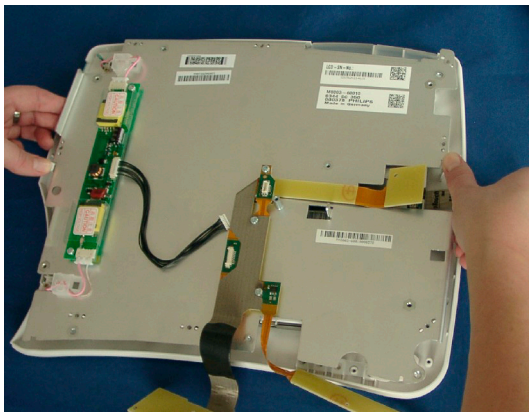


6 Slip a screwdriver under the end of the flex panel adapter cable and lift upwards to remove the connector to the display.



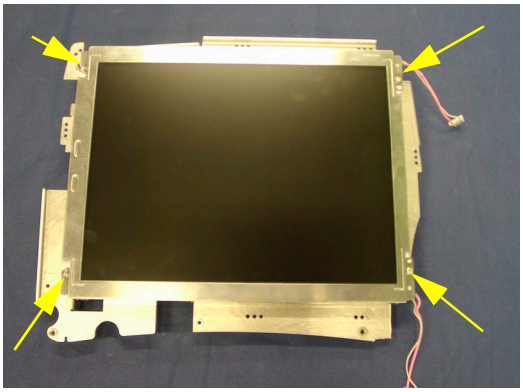
7 Remove the eight screws and carefully lift off the display assembly by releasing the two snaps in the monitor bezel.





NOTE This procedure must be performed in a dust free environment. The display assembly may be hard to remove from the touch panel due to the gasket (adhesive strips) holding the two together.

8 Turn the display unit around and remove the four remaining screws to separate the display from the metal chassis.

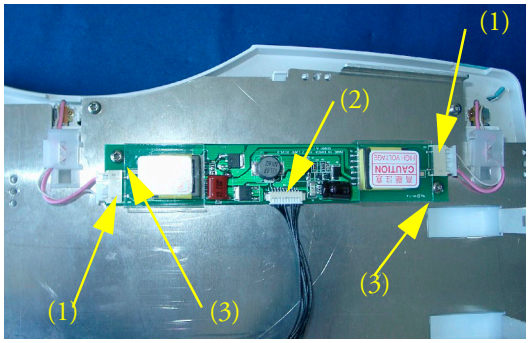


Removing the Backlight Inverter Board

1 Separate the front and back half of the monitor as described above.

2 Unplug the backlight tube cables (1) and the connector to the flex panel cable (2).

3 Remove the two screws (3) securing the Backlight Inverter Board and pull off the board.



NOTE The backlight tube cable must not be unplugged for display exchange

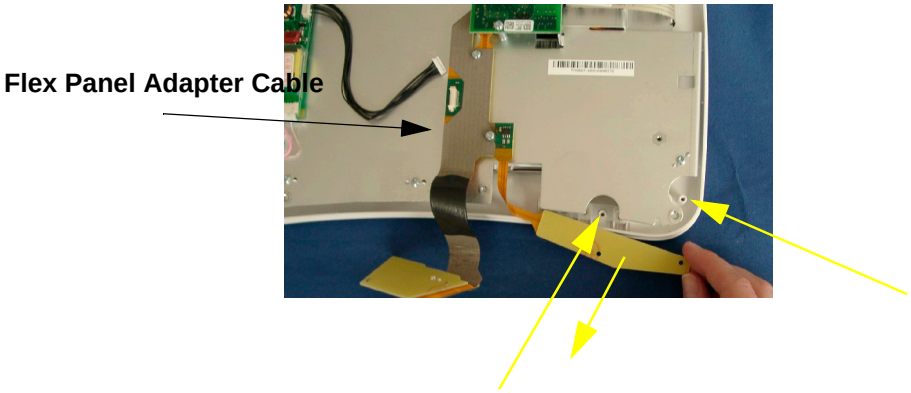
Removing the Silicon Mat for the Power Switch and the LEDs

1 Separate the front and back half of the monitor as described above.

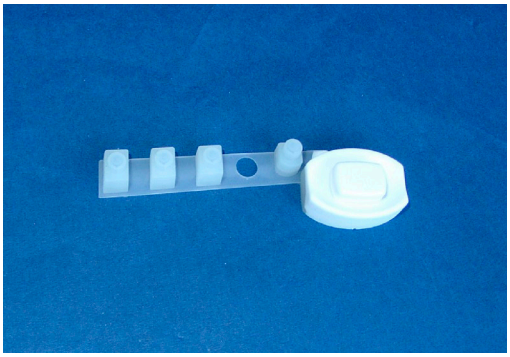
2 Remove the two screws securing the power switch and the LED board and pull out the board. The board and the screws are part of the flex panel adapter cable.

Reassembly Note: The screws securing this board are self-cutting - turn in opposite direction first when re-inserting them

.



3 Pull out the silicon mat (for power switch and LEDs).

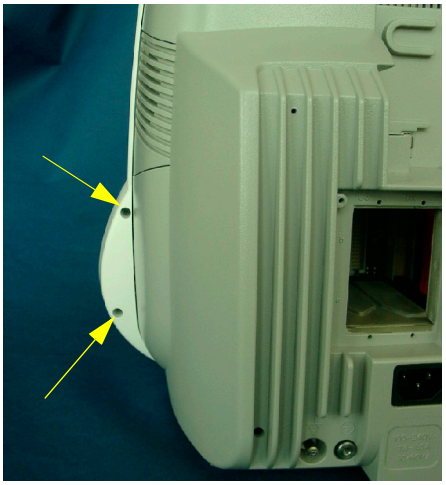


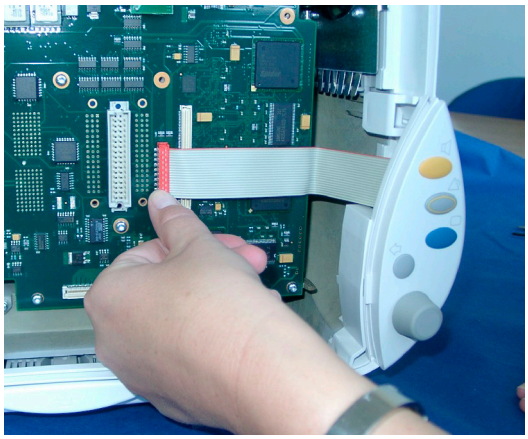
Removing the Navigation Point Assembly

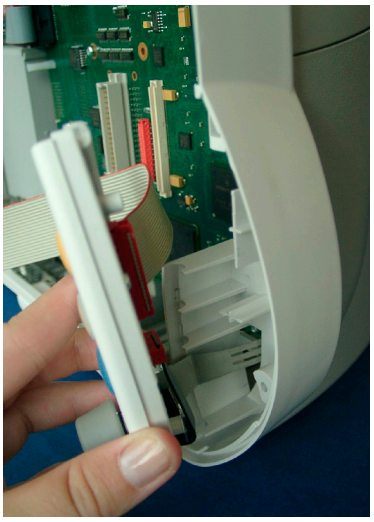
1 Separate the front and back half of the monitor as described above.

2 Remove the two screws at the back of the navigation point assembly and remove the connector from the main board by pulling it towards front. Then pull off the navigation point assembly.

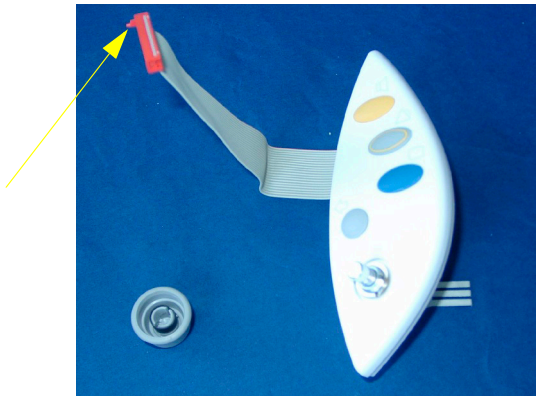
NOTE To remove the flat ribbon cables with red connectors (e.g. Navigation Point cable) simply pull directly on the cable.







Reassembly Note: When reinserting the connector insert the protruding nose at the top



Reassembly Note: When re-inserting the input device, make sure the spring is inserted into the hole in the plastic housing.



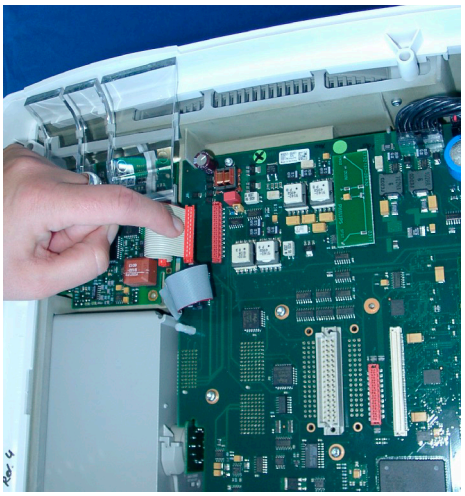
NOTE The screws securing the Navigation Point Assembly are self-cutting - turn in opposite direction first when re-inserting them.

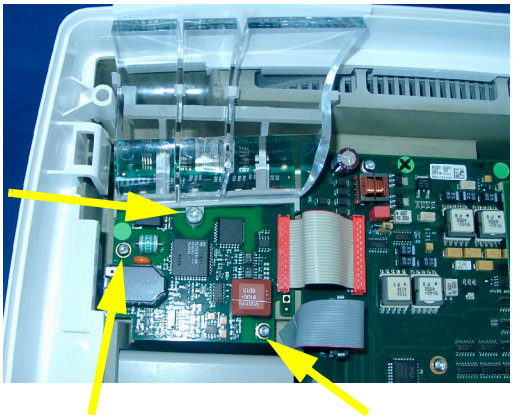
Removing the ECG Out/Alarm LED Board

1 Separate the back and front half of the monitor as described above and lay the back half of the monitor on its back.

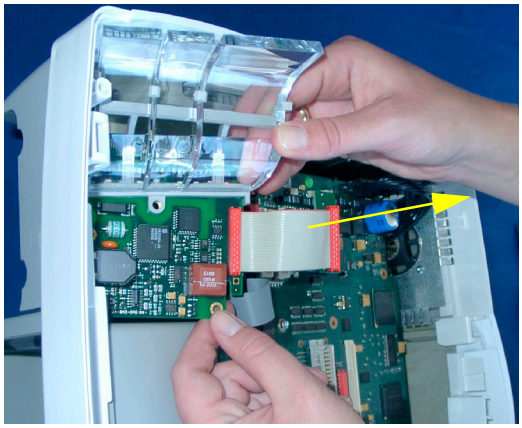
2 Remove the flat ribbon connector of the ECG Out/Alarm LED board from the main board and remove the 3 screws that hold the board and lightpipes.

NOTE To remove the flat ribbon cables with red connectors (e.g. Navigation Point cable) simply pull directly on the cable.



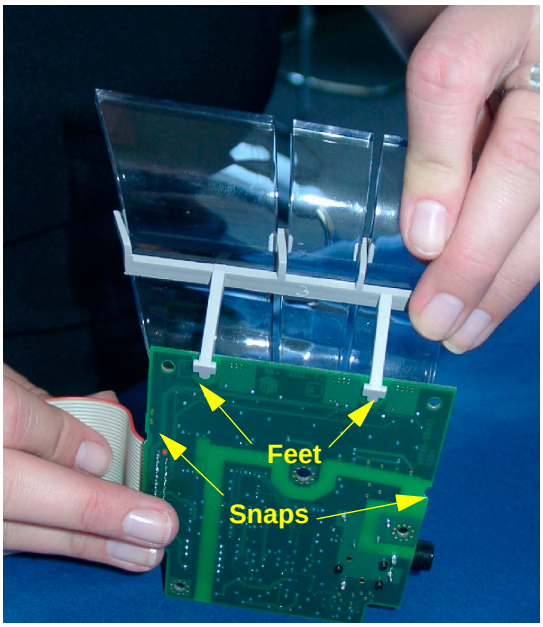


3 Lift the board out to the right so the ECG out connector is pulled out of the monitor housing.



NOTE The connector must be unplugged from the main board.

4 Pull off the lightpipe holder if necessary. It is snapped in on both sides of the board.



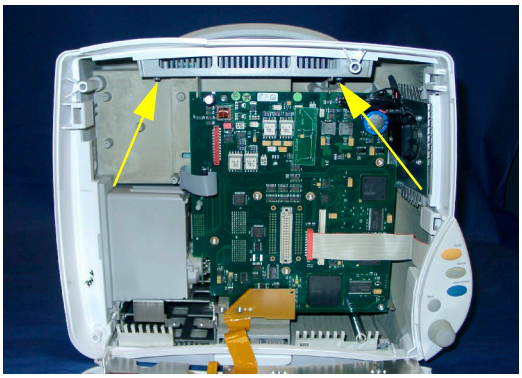
Reassembly Note: Make sure the snaps and feet are properly hooked into the ECG Out board when reattaching the lightpipe holder.

Removing the Handle

1 Separate the front and back half of the monitor as described above.

2 Remove the ECG Out board as described above.

3 Remove the two screws securing the handle and remove the handle.

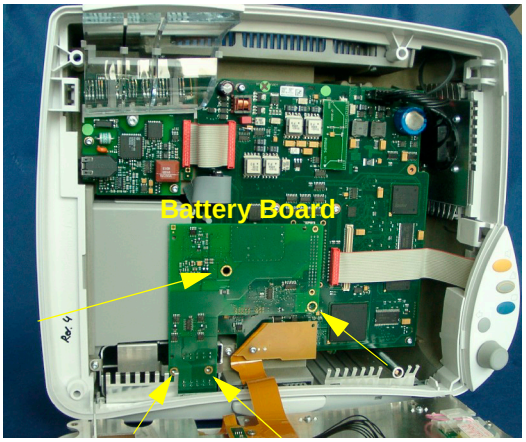


Removing the Main Board

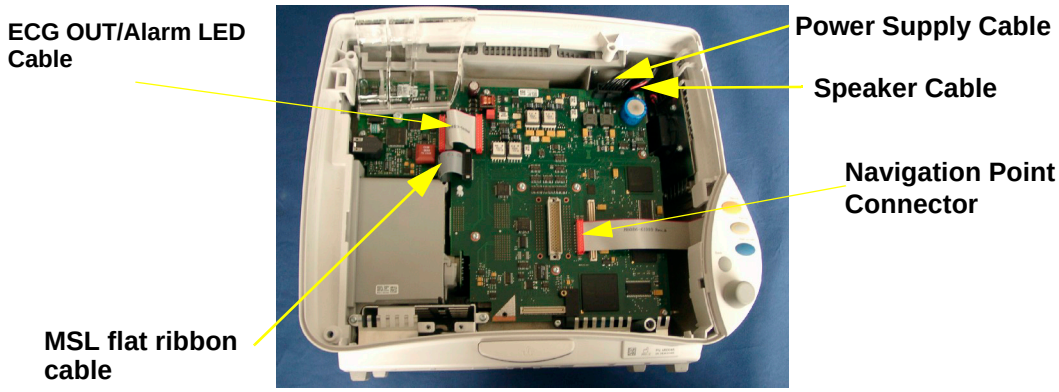
1 Remove the I/O and the System Interface boards as described above.

2 Separate the front and back half of the monitor as described above

3 If a battery board is included always remove it before the main board by removing the four screws on the board.

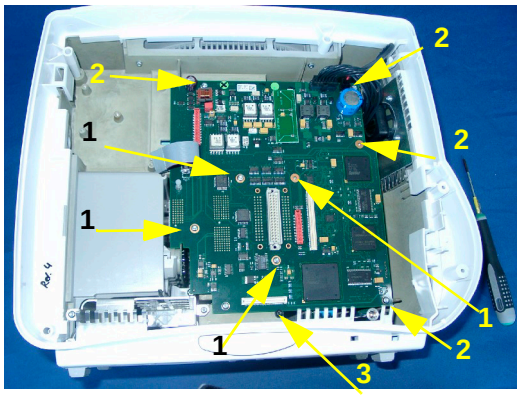


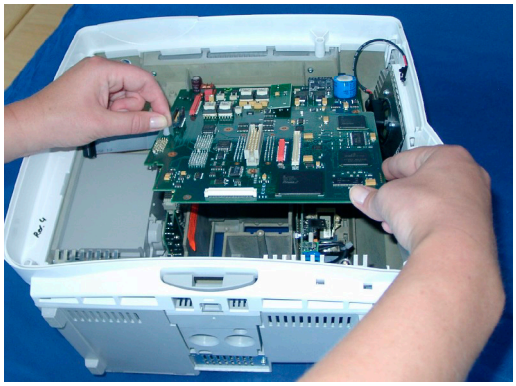
4 Unplug the Navigation Point connector, the MSL cable, the power suppy cable, the speaker cable and the ECG Out/Alarm LED cable from the main board.



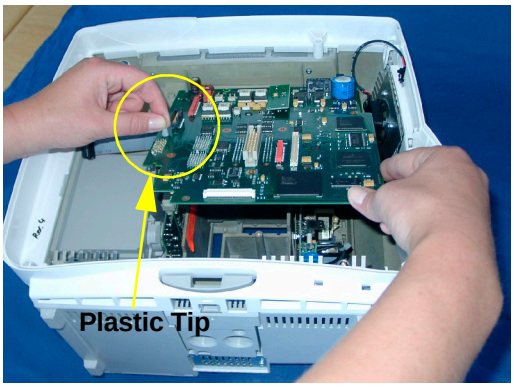
NOTE To remove the flat ribbon cables with red connectors (e.g. Navigation Point cable) simply pull directly on the cable. The MSL, power supply and speaker cables have different security locks and must be unlocked in order to be removed.

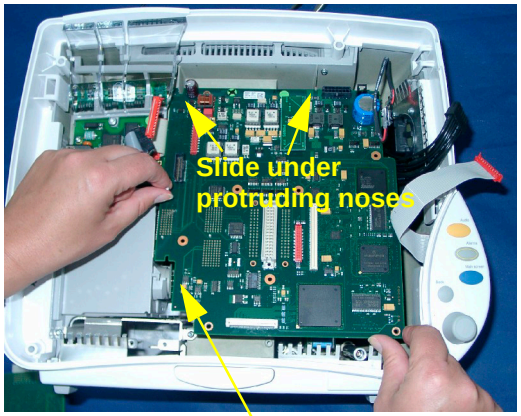
5 Remove the nine screws, pull the main board out of the rack connector and remove the board by moving it towards the bottom of the monitor.

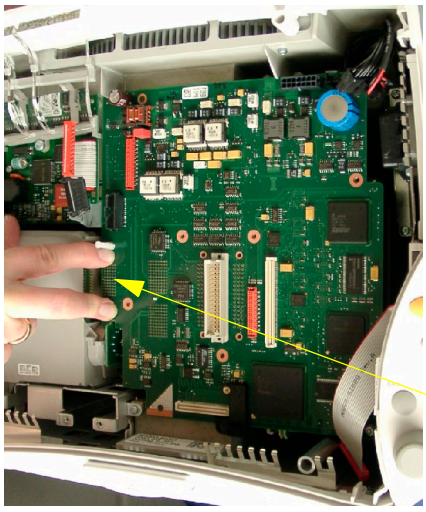




Reassembly Note: Hold the main board with your left hand on the plastic tip and re-insert it, making sure that the board is properly aligned with the protruding noses of the rear chassis and the slit for the internal module rack board and that the board is connected properly to the rack connector. The screws must be reinserted in the order specified in the picture above. Screw number 3 is attached to a black spacer which is not shown in this picture.







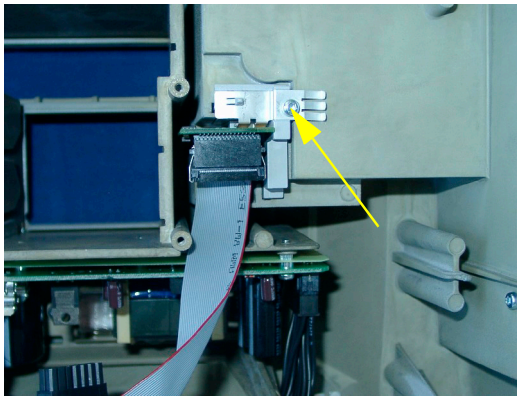
NOTE The main board must be removed before removing: the power supply, the internal module rack with the rack board, the MSL board and the speaker

Removing the MSL Board

1 Separate the front and back half of the monitor as described above.

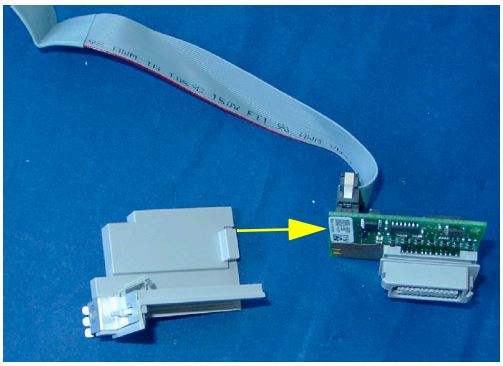
2 Remove the main board as described above.

3 Remove the screw securing the MSL board and pull the board out upwards along with its housing.

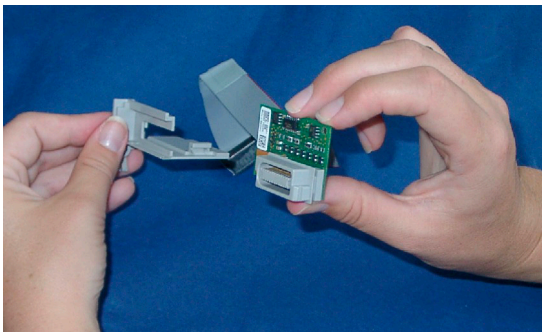


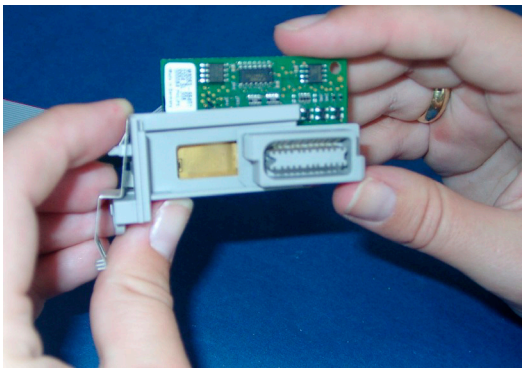


4 Pull the MSL board out of its housing if required.



Reassembly Note: The MSL board and its housing must be properly aligned. Push down on the spring to slide the board into its position.



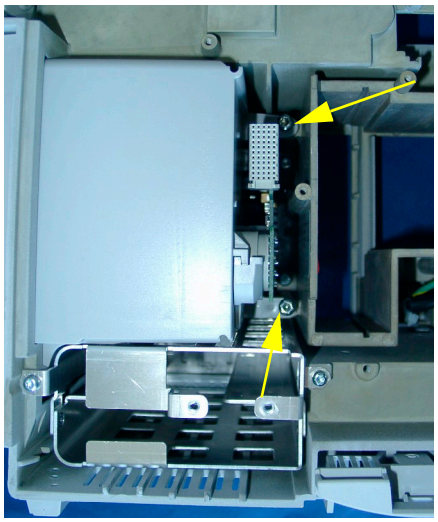


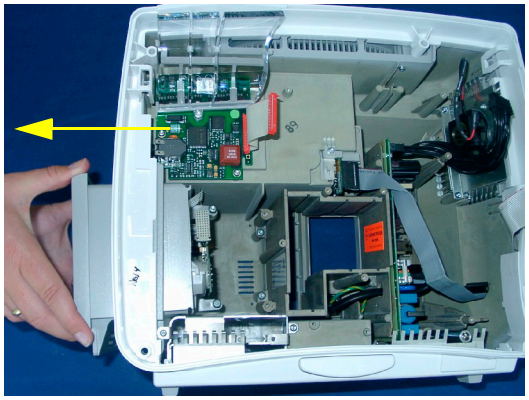
Removing the Internal Module Rack

1 Separate the front and back half of the monitor as described above.

2 Remove the main board as described above

3 Loosen the two screws securing the module rack (do not remove them completely!) and pull out the rack to the left.





Removing the Power Supply Assembly

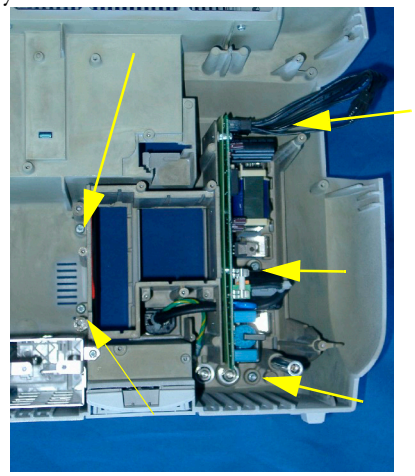
NOTE When replacing the power supply, the monitor must have the serial number reloaded. A support tool is required to perform this task. Please see the Support Tool Instructions for USe document for details on how to load a new serial number.

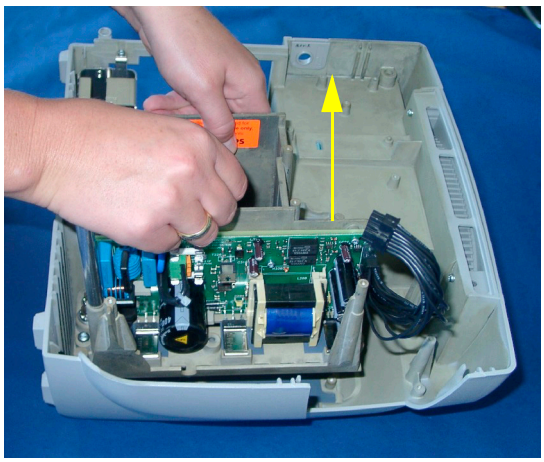
1 Separate the front and back half of the monitor as described above.

2 Remove the main board and the internal module rack, if present, as described above

3 Remove the MSL board as described above.

4 Remove the five screws and remove the power supply by pulling it up. Pulling the power supply up may be difficult due to adhesive foil between the rear chassis and the power supply.

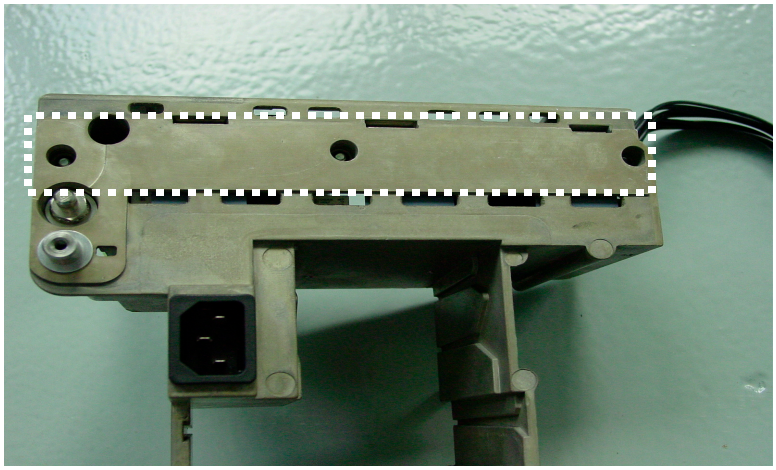


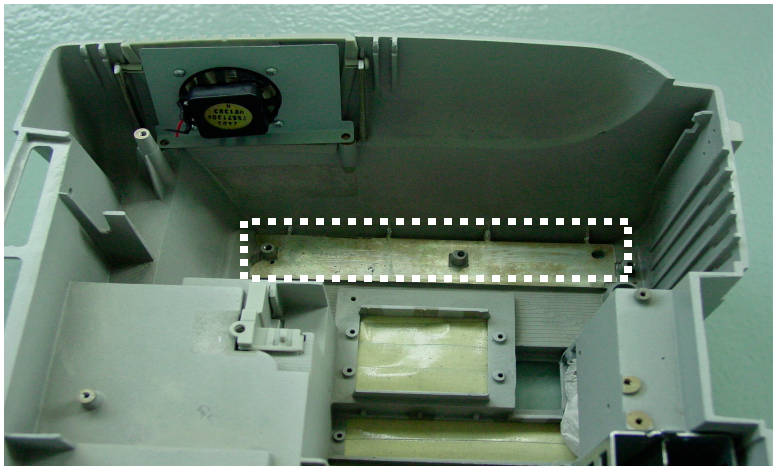


CAUTION Be careful not to damage any components of the Power Supply board.

Reassembling the Power Supply Assembly

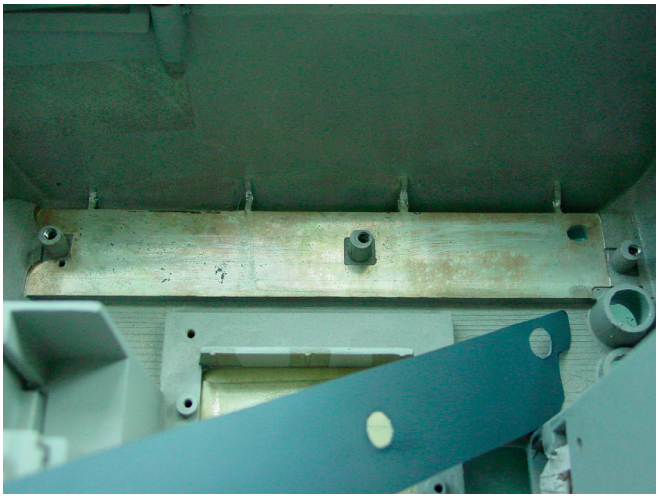
1 Clean the Power Supply Assembly in the areas shown below and remove any rests of the old heat conducting foil.

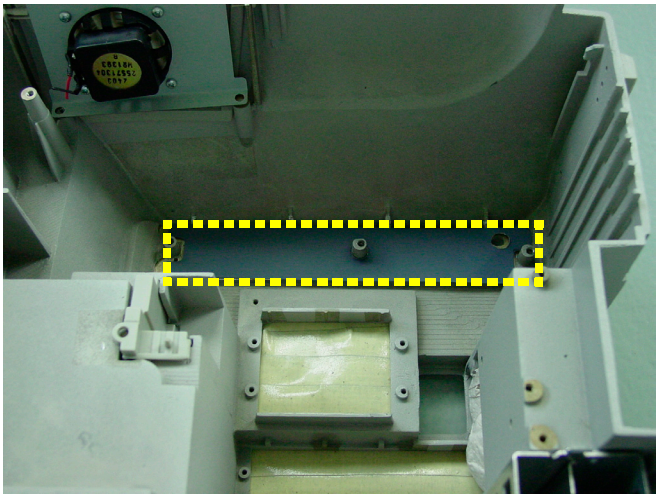




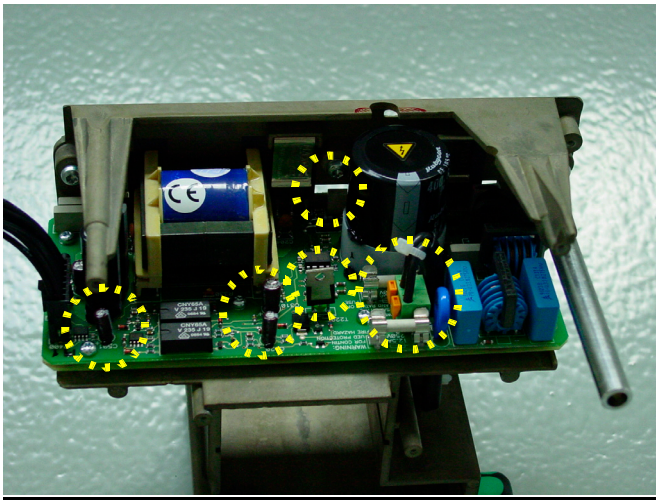
2 Remove the protective layer from the new heat conducting foil, place the foil over the domes and press it onto the power supply assembly using your thumbs.

NOTE Make sure there are no bubbles under the foil. If bubbles appear, remove the foil and position it again.





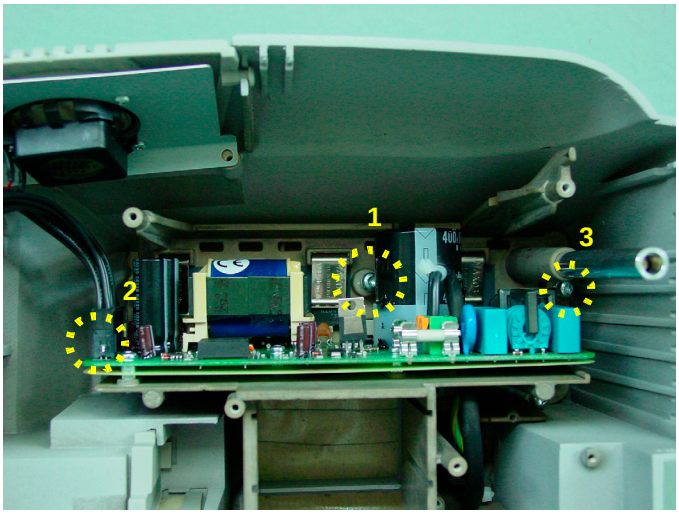
CAUTION Make sure that none of the circled parts shown below are bent or damaged in any way. If they are damaged, return the power supply.



3 Insert the Power Supply into the monitor rear housing as shown below. Make sure the power supply snaps into the domes and is properly aligned with the screw holes.



4 Tighten the five screw in the order specified below.





CAUTION When reinserting screw No.1 please take care not to damage the nearby capacitor.

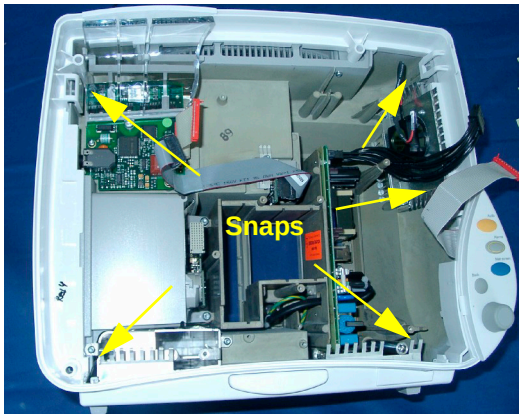
NOTE Insert screws carefully into the magnesium rear chassis of the monitor and do not tighten them too much as the material can break.

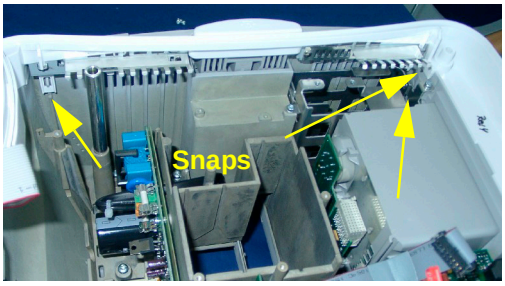
Removing the Loudspeaker

1 Separate the front and back half of the monitor as described above.

2 Remove the main board as described above

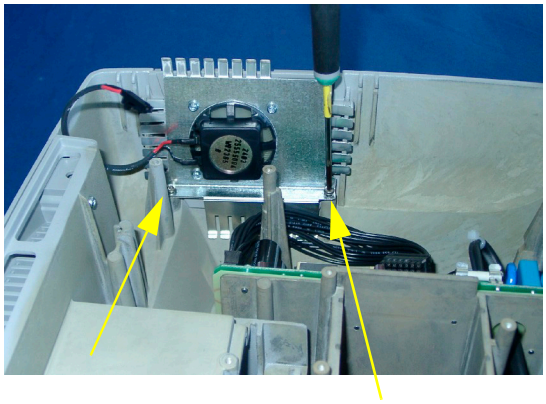
3 Remove the white plastic frame from the monitor rear chassis by releasing the five snaps in the rear chassis. You can use a flat-tipped screw driver to do this.
Reassembly Note: Make sure the white frame snaps into place when reinserting.

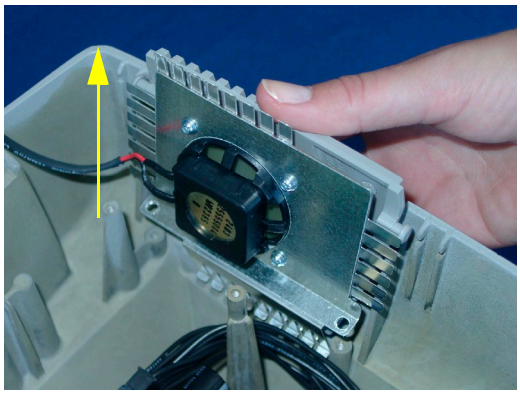




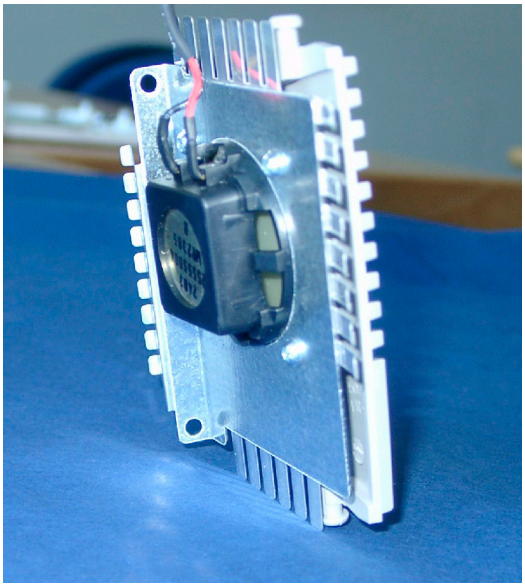
Bottom Edge of Housing

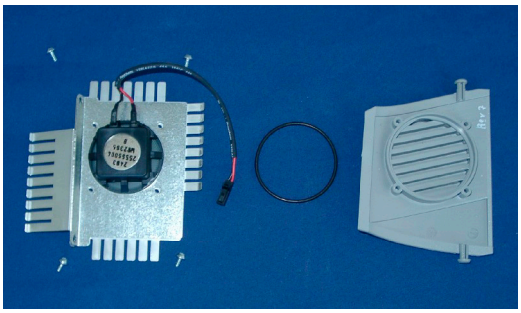
4 Remove the two screws securing the loudspeaker and pull out the speaker along with its housing.





5 Remove the four screws to remove the speaker housing.
Reassembly Note: When reinserting the speaker into its housing, make sure that the cables are pointing upwards.

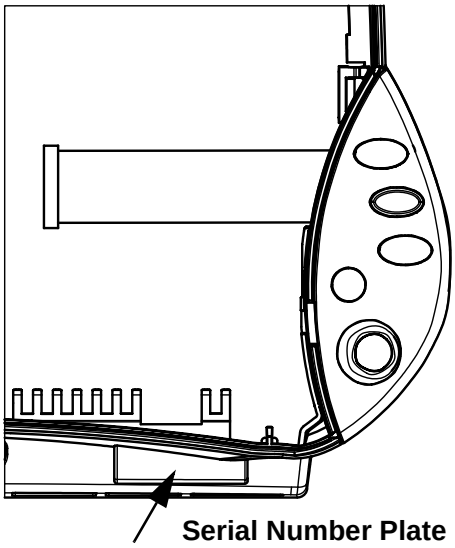




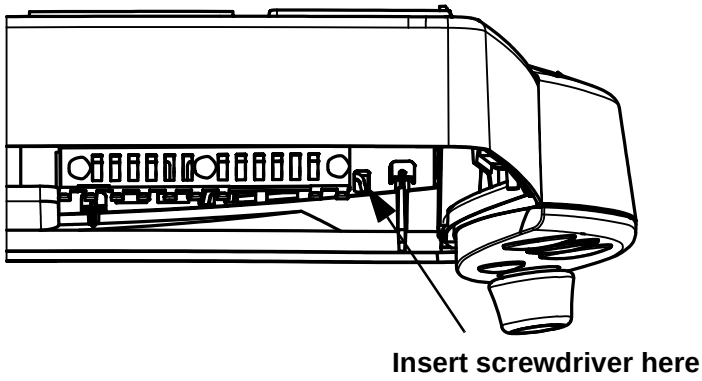
Changing the Serial Number Plate

In case the white plastic frame needs to be exchanged, the serial number plate needs to be removed and attached to the new frame. To remove the plate:

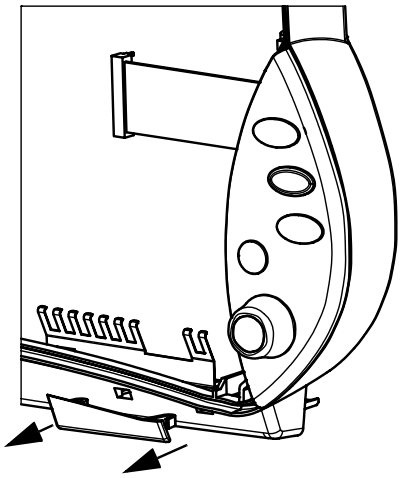
1 Separate the front and back half of the monitor as described above.The serial number plate is located inside the white plastic frame.



2 Insert a flat-headed screwdriver and bend the plastic spring to the left as shown in the diagram below.



3 Hold the plate with the other hand and move the right side out. The other side can be removed from the front.



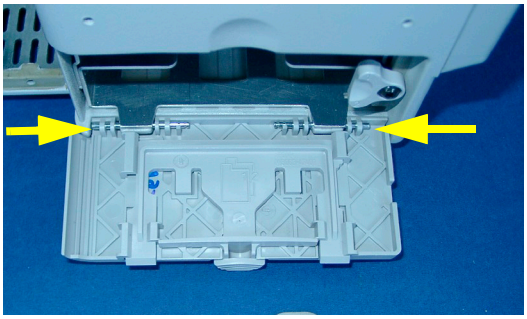
Exchanging the battery door

The battery door must be exchanged if the  symbol is not printed on it.The battery door with the symbol should look like this:



1 Open the battery door.

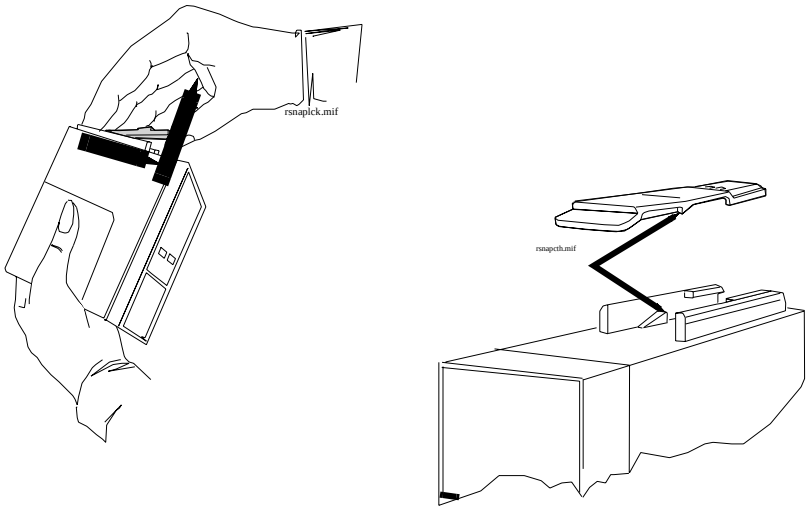
2 Using a screwdriver, push the two pins inwards to release the battery door.



3 Insert the new battery door and push the two pins outwards to secure it.

Plug-in Modules and MMS Extensions

The snap lock holds the plug-in module in the FMS.



To remove the snap lock:

1 Grip the module firmly in one hand and using your thumb, pull the front edge of the snap lock away from the plug-in module so that the lug on the snap lock clears the retaining edge of the module.

2 Push on the rear edge of the snap lock to move the snap lock through the slot toward the front of the module until it is clear.

To replace the snap lock:

1 Locate the snap lock into the slot on the bottom of the module.

2 Slide the snap lock toward the rear of the module until the lock snaps into position.

Plug-In Module Disassembly

Disassembly of the parameter module enables replacement of the front assembly.

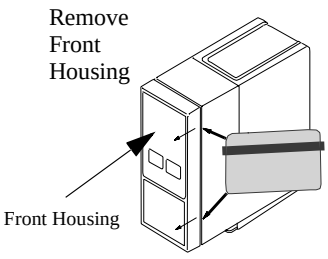


Figure 10 Removing the Module Front Housing

WARNING When you disassemble/assemble a plug-in module a patient leakage current test must be performed before it is used again for monitoring.

To disassemble a plug-in module:

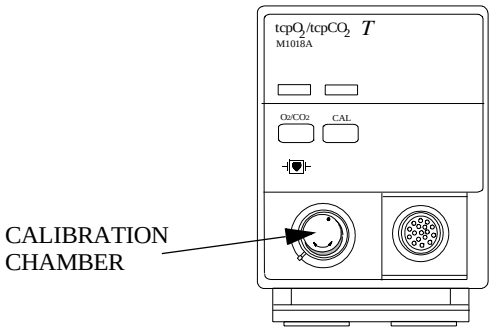
Remove the front housing.

- Place the module on a flat surface and insert a card (similar to a credit or cheque type card) into one side of the module to disengage the 2 tabs securing the front housing to the module housing.
- Pull the edge of the front housing away from the module housing.
- Carefully turn the module over so the free edge does not reengage and repeat the first two steps on the other side of the module. The front housing should now be free of the module housing.

To reassemble a plug-in module:

Snap-fit the front housing onto the front of the module case so the openings in the front housing match the LEDs and keys.

$tcpO_2/tcpCO_2$ Calibration Chamber Kit



M1018A Traditional CMS-Style Module



Front Housing



Calibration Chamber



Front Housing with Calibration Chamber

M1018A New Style Module

NOTE You must order a new front housing AND a new calibration chamber kit when repairing a traditional CMS-Style M1018A module. The calibration chamber must be replaced first for the new style housing to fit properly

To remove the calibration chamber

1 Using a flat-tipped screwdriver, remove the screw holding the calibration chamber in place on the front of the plug-in module.

2 Lift the chamber off the plug-in module. Ensure that the white plastic switch tip located in the module is not lost.

To replace the calibration chamber

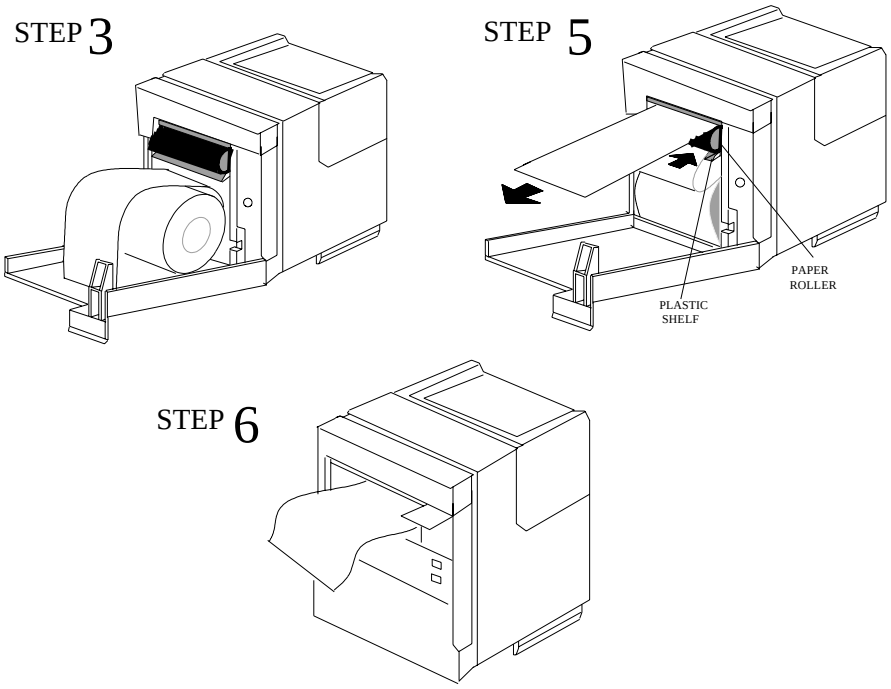
1 Ensure the white plastic switch tip is in place in the plug-in module.

2 Place the calibration chamber in the allocated position on the plug-in module.

3 Insert and tighten the screw into the calibration chamber, securing it to the plug-in module.

Recorder Module Paper

The recorder will not run when the door is open or when the recorder is out of paper. To prevent damage to the recorder module, use only Philips approved paper (Philips re-order number 40477A/B)



To load paper into the recorder module:

1 Remove the empty core from the previous roll of paper.

2 Cut off and discard the first few inches of paper to eliminate any traces of adhesive.

3 Pull out several inches of paper from the new roll, holding the roll with the loose end hanging over the top toward you.

4 Open the door and push the paper roll into the holders in the recorder.

5 Thread the paper under the roller and over the plastic shelf far enough so it goes around the roller and comes out above it.

6 Drape the paper over the end of the door and close the door. The paper should be visible and draped down in front of the door.

Disassembly Procedures for the Measurement Server Extension (M3015A)

It is recommended that you replace all the replaceable parts in the Extension (CO_2 Scrubber and Pump) after 15 000 hours (approximately 3 years) of continuous use.

Tools Required:

- A thin-bladed screwdriver.
- A pair of large tweezers.
- In addition, for removing the pump, you will need a large-bladed screwdriver.

WARNING There is high voltage inside the Instrument (800V). Do not connect the Measurement Server Extension to a Monitor while the Extension housing is open.

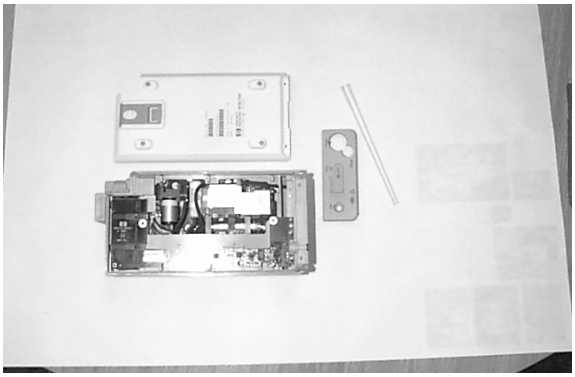
As well, parts inside the Instrument may be contaminated with bacteria. Protect yourself from possible infection by wearing examination gloves during these procedures.

Removing the Front Cover

To remove the front cover, do the following:

1 Remove the server and the monitor from the extension.

2 Use a thin-bladed screwdriver to prise the grey front cover (the console covering the measurement connector hardware) gently from the bottom of the extension. Position the screwdriver in the small slits provided for this purpose. The front cover then clicks away from the extension.



3 Remove the front cover.

Removing the Extension Bottom Cover

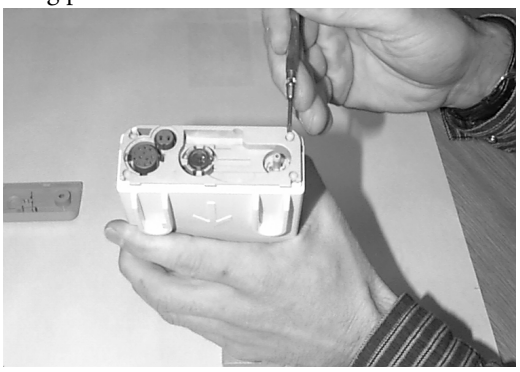
To remove the Extension bottom cover, do the following:

1 Position the extension on the dual link bar with the measurement connector hardware facing upwards and the arm of the dual link bar towards you. There are four long mounting pins threaded into the extension in each of the four corners under the cover. Locate the heads of the two long mounting pins on the side away from you

2 Use tweezers to prise the pins gently out enough to be removed by hand.

3 Remove the two pins and set them aside for refitting.

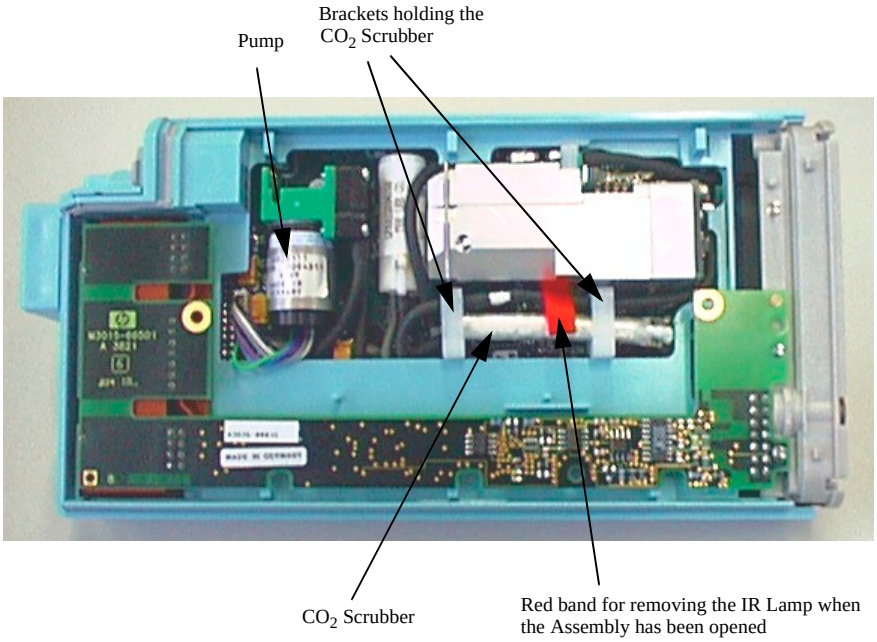
NOTE Do not lose these long mounting pins since the Extension will not function unless they are in place..



4 Using your hands, gently pry the bottom cover away from the Extension at the link bar end first. The bottom cover is press-latched at the link bar end. Remove it gently making sure not to bang or touch the inside of the Extension.

NOTE If you accidentally try to remove the wrong side of the bottom cover, you will notice that it is attached to the inside of the Extension with a ribbon connector and that the dual link bar prevents you from removing it completely. **Do not try to forcibly remove the wrong side of the M3015A cover; you cannot access replaceable parts from this side.**

The following illustration shows the location of the replaceable parts in the M3015A Measurement Server Extension.

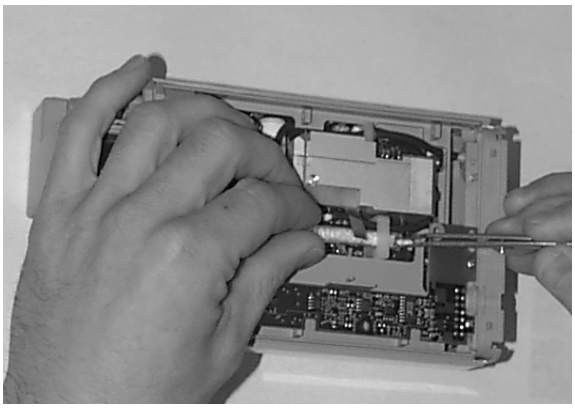


Removing the CO_2 Scrubber

To remove the CO_2 Scrubber, do the following:

1 Locate the CO_2 Scrubber in the Extension.

2 Being careful not to touch anything else in the Extension, use tweezers to pull the body of the CO_2 Scrubber out of the bracket.



3 Holding the body of the CO_2 Scrubber with your fingers, carefully disconnect the Extension intake tube from the scrubber end and remove the CO_2 Scrubber from the Extension.

4 Dispose of the CO_2 Scrubber according to local legal requirements for low volume chemical waste.

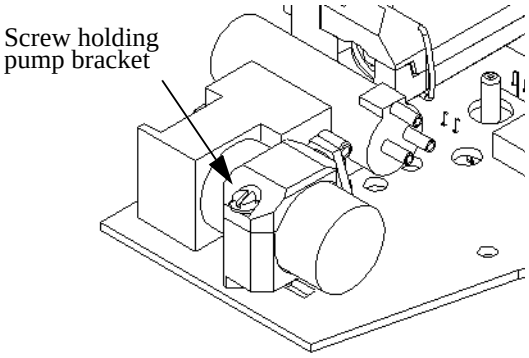
NOTE Now that it is exposed, do **NOT** allow anything to fall into the Infrared Lamp assembly.

Removing the Pump

To remove the Pump, do the following:

1 Locate the Pump in the Extension.

2 Being careful not to touch anything else in the Extension, unscrew the screw holding the pump bracket in position. Lift the top part of the bracket away and lift out the pump.



3 Gently disconnect the flow tubing attached to the Extension from the Pump.

NOTE Be sure to note which tube attaches to the inlet and which tube attaches to the outlet.

4 Gently disconnect the power lead which attaches the Pump to the Extension.

5 Remove the Pump.

NOTE After replacing the Pump, reset the displayed value displayed using the Reset PumpOpTime selection (Service Mode>CO_2 Setup). When the PumpOpTime has been reset an INOP will be generated: "CO_2 OCCLUSION". To clear this INOP you must perform a flow check and store the flow in Service Mode (select "Store Flow")

Refit Procedures for the Measurement Server Extension

Tools Required:

- A thin-bladed screwdriver.
- A pair of large tweezers.
- In addition, for refitting the Pump, you will need a large-bladed screwdriver.

WARNING There is high voltage inside the Instrument (800V). Do not connect the Measurement Server Extension to a Monitor while the Extension housing is open.

As well, parts inside the instrument may be contaminated with bacteria. protect yourself from possible infection by wearing examination gloves during these procedures.

Refitting the CO_2 Scrubber

WARNING The CO_2 Scrubber contains lithium hydroxide monohydrate. This is a strong base. Do not open or damage the CO_2 Scrubber. If you come into contact with the CO_2 Scrubber material, flush the area immediately with water and consult a doctor.

To refit the CO_2 Scrubber, do the following:

1 O_2 Scrubber through the bracket to meet the Extension intake tube.

2 Push the intake tube firmly into the scrubber end to connect it.

3 Holding the body of the CO_2 Scrubber with tweezers, feed the CO_2 Scrubber fresh air intake under the second bracket and position it.

Refitting the Pump

To refit the Pump, do the following:

1 Gently connect the power lead to the Extension.

NOTE The power lead can only be connected one way.Do not try to force the power lead into position. Instead, align it correctly and connect it gently.

2 Connect the flow tubing to the Pump.

NOTE Be sure to reconnect the inlet tube to the inlet valve and the outlet tube to the outlet valve.

1 Being careful not to touch anything else in the Extension, insert the pump into the bracket on the PC board. Make sure that the pump is horizontal and does not touch the PC board. (Vibration from the pump in operation will damage the Extension if the pump touches the PC board.)

2 Replace the top part of the bracket and screw firmly into position.

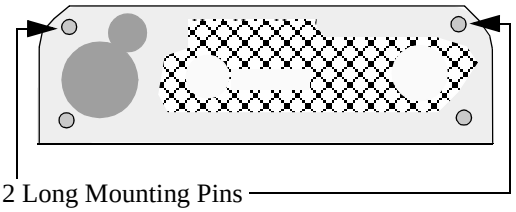
NOTE After replacing the Pump, reset the displayed value using the Reset PumpOpTime selection (Service Mode>CO_2 Setup). When the PumpOpTime has been reset an INOP will be generated: "CO_2 OCCLUSION". To clear this INOP you must perform a flow check and store the flow in Service Mode (select "Store Flow").

Refitting the Extension Bottom Cover

To refit the Extension bottom cover, do the following:

1 Latch the link bar end into place then press-click the bottom cover back into place covering the interior of the Extension.

2 Holding the bottom cover firmly in place, thread the two long mounting pins back into the Extension making sure to thread them all the way to the end.



Refitting the Front Cover

To refit the front cover, press-click it back into place over the measurement connector hardware.

General Reassembly/Refitting Comments

- Ribbon Connections—Make sure male-female ribbon connections are correctly lined-up.
- Open Component—Do not allow anything to fall into the open component.

Following Reassembly

Once you have reassembled the Instrument, you must perform a safety and performance check on the Instrument. Refer to *Testing and Maintenance*.

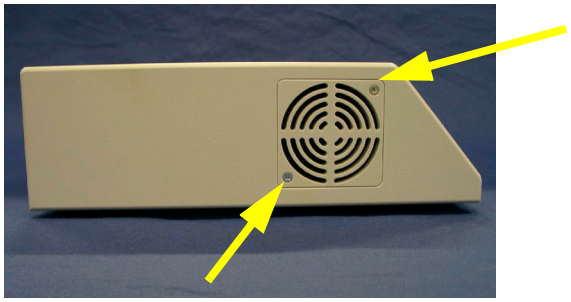
Smart Battery Charger LG1480 (M8043A)

You should clean both air filter mats on a regular basis. Depending on the frequency of use and the environmental conditions (dust etc.), the interval can range from 6 to 24 months.

Cleaning the Air Filter Mats

The air filters are located on the right and left side of the battery conditioner. Perform the procedure below for each side.

1 Remove the 2 screws securing the filter cover and take off the cover.



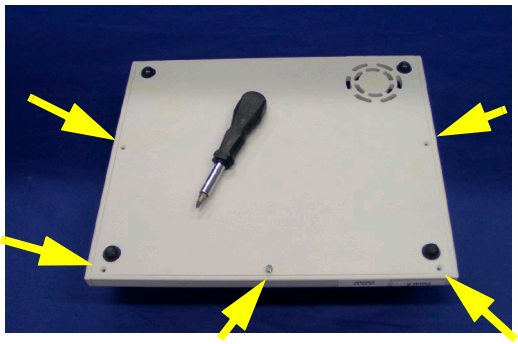
2 Remove the filter mat and clean the dust out by shaking.



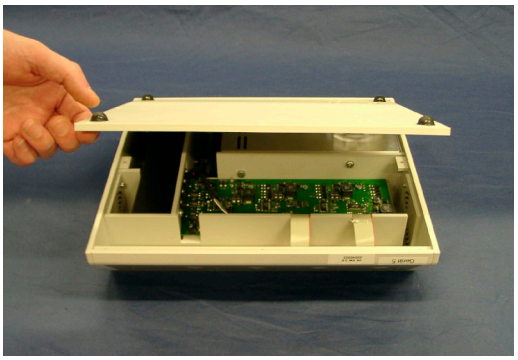
3 Re-insert the mat and refit the cover and screws.

Replacing the Fan

1 Turn the battery conditioner upside down and remove the 5 screws at the bottom with a T20 screwdriver.

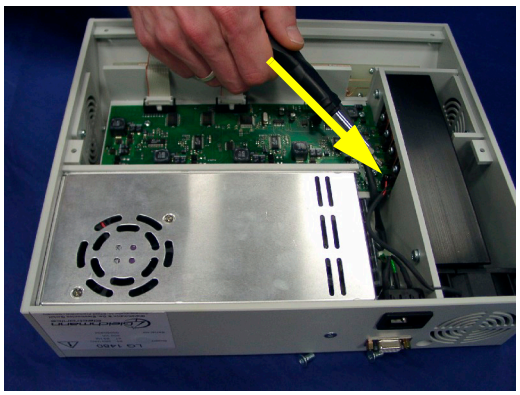


2 Lift the bottom cover up at the front and pull it off.





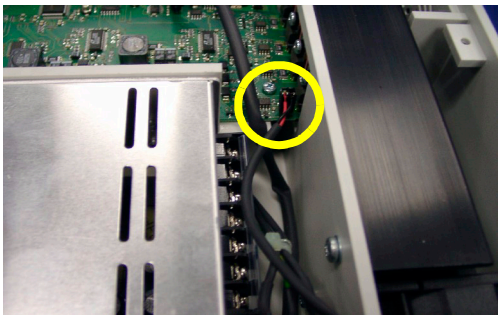
3 Unplug the fan connector from the main board.



4 Lift the fan out of the battery conditioner housing.



5 When replacing the fan make sure the connector is plugged in correctly as shown in the photograph below.

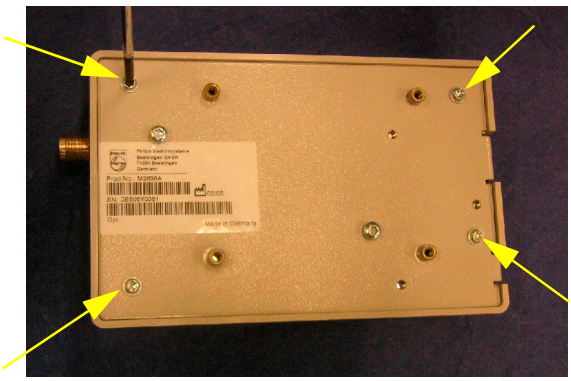


IntelliVue Instrument Telemetry (IIT)

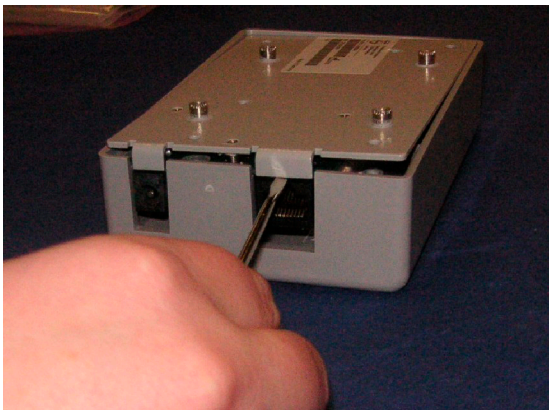
The following sections describe how to exchange the IIT module, the IIT PCA board and the flex cable of the IIT adapter for MP40/50 monitors.

Exchanging the PCA board or the Flex Cable

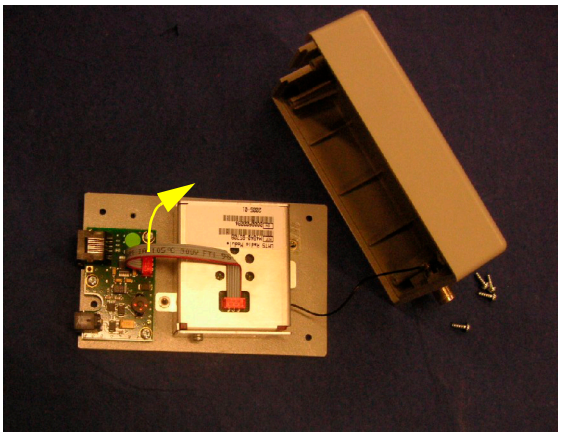
1 Remove the four screws at the bottom of the IIT box.



2 Lift up the bottom cover using a screwdriver.

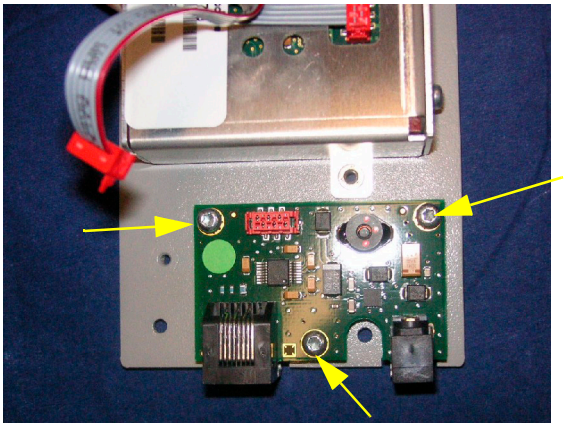


3 Turn the IIT box around and lift the top cover off completely.Then unplug the flex cable from the PCA board.



4 If you need to exchange the flex cable, unplug the connector from the IIT module and replace the cable.

5 Remove the three screws securing the PCA board and exchange the board.

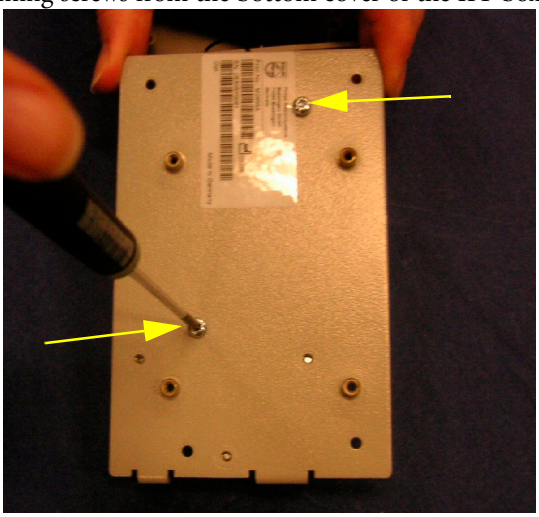


6 Reassemble the IIT box by performing the above steps in reverse order.

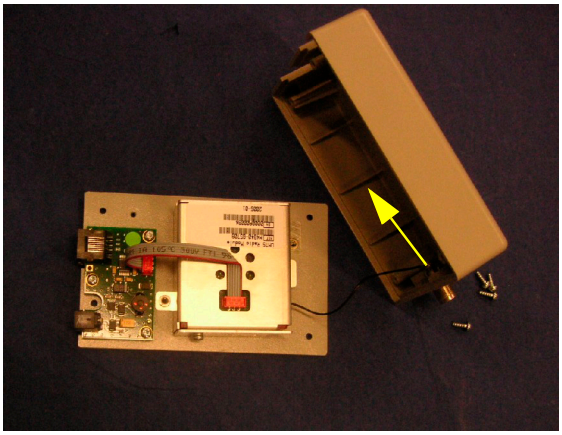
Exchanging the IIT Module

1 Perform steps 1 to 3 of the procedure *Exchanging the PCA board or the Flex Cable*.

2 Remove the two remaining screws from the bottom cover of the IIT box.



3 Remove the antenna connector.



4 Lift out the IIT module and exchange it.

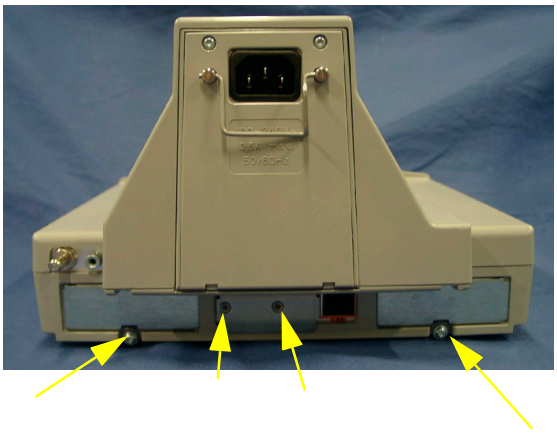
5 Reassemble the IIT box by performing the above steps in reverse order.

Docking Station

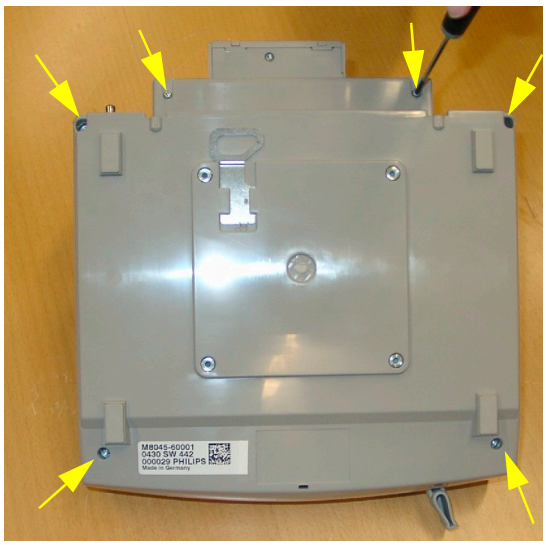
The following sections describe the exchange of the main board and the flex cable of the Docking Station.

Exchanging the Main Board

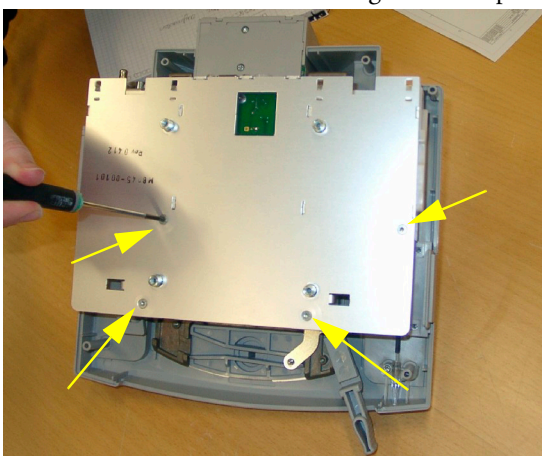
1 Remove the metal covers covering the alarm and video connectors and I/O slots..

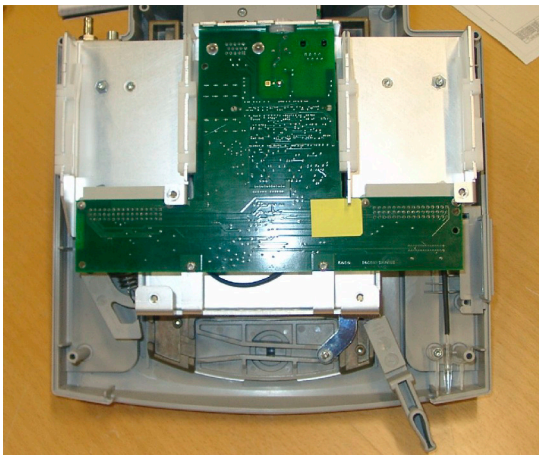


2 Remove the six screws at the bottom of the docking station and lift the bottom cover off.

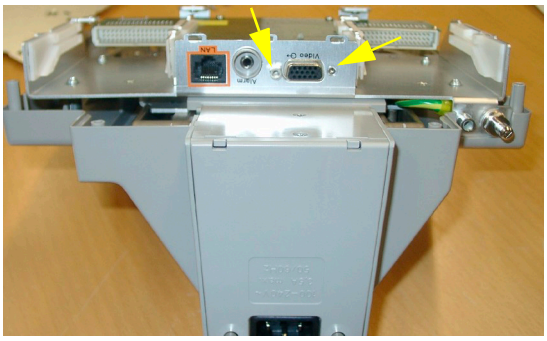


3 Remove the four screws securing the metal plate and lift it off.

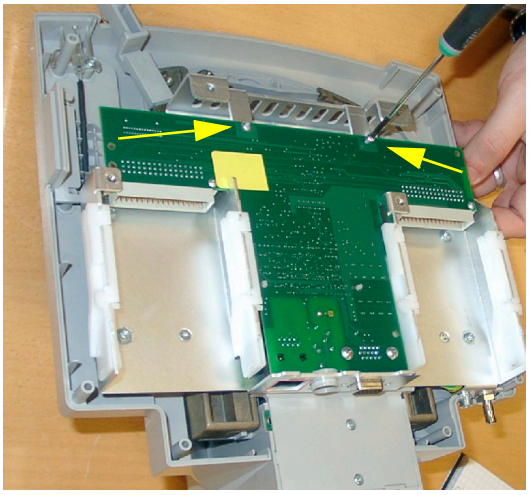




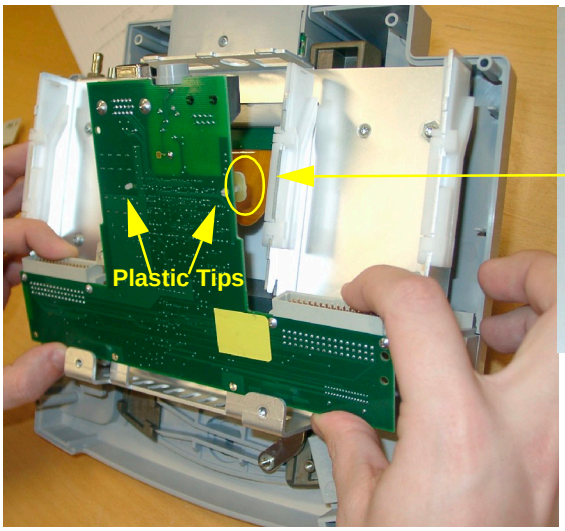
4 Remove the two screws next to the video connector.

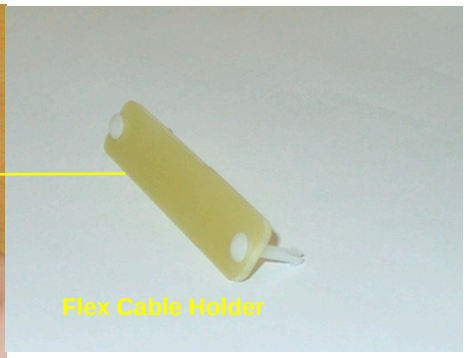


5 Remove the two screws on the main board.

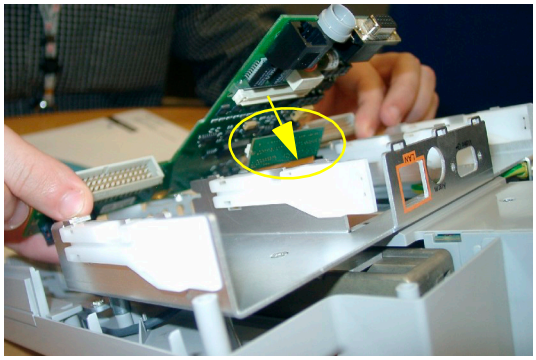


6 Push the platic tips through the board, lift the board up and remove the flex cable holder under the board.



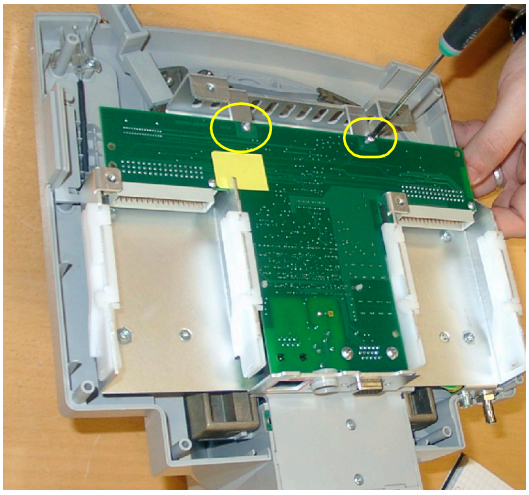


7 Unplug the flex cable from the main board and remove the board.



8 Perform the above steps in reverse order to reassemble the docking station.

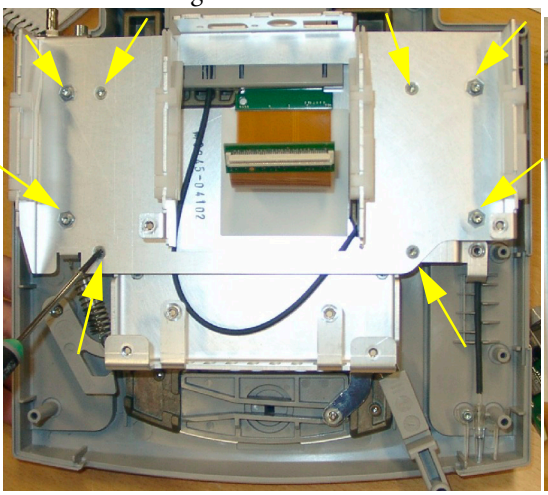
Reassembly Note: Make sure that the main board is placed on top of the metal flaps at the front of the docking station and not below..

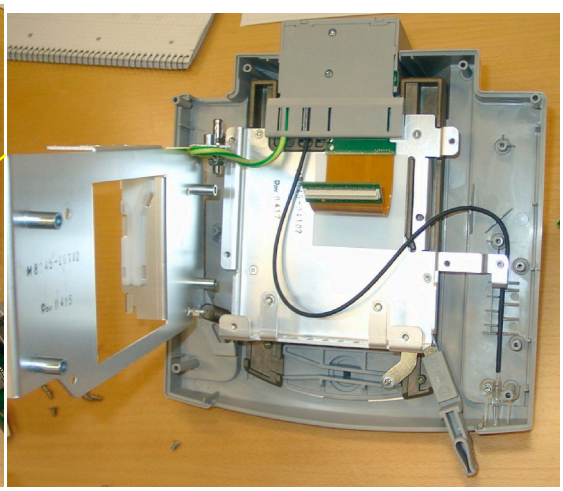


Exchanging the Flex Cable

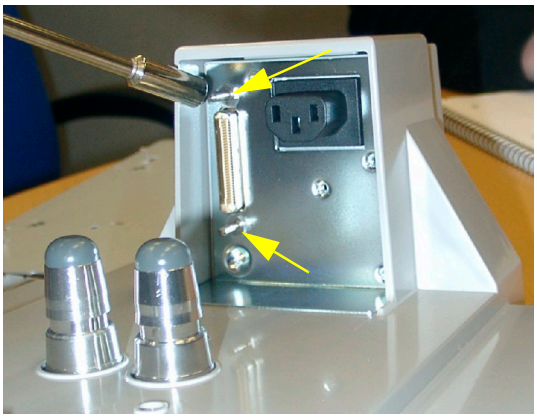
1 Perform the steps listed under “Exchanging the Main Board”.

2 Remove the eight screws and lift off the metal sheet to the side.

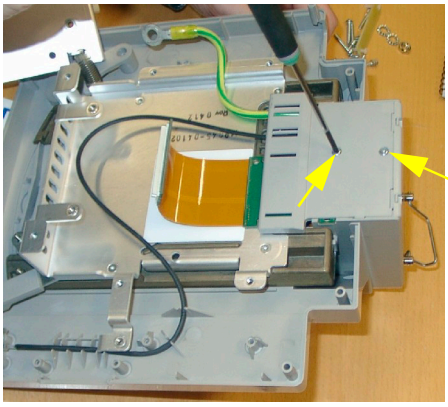




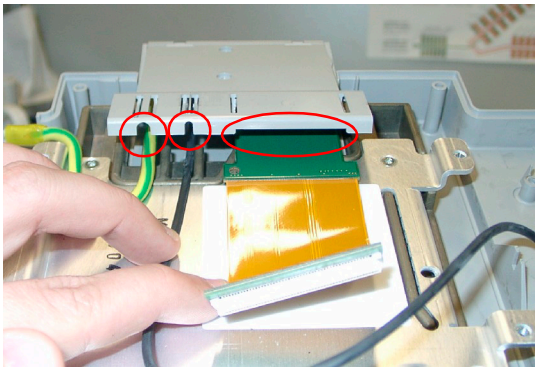
3 Remove the guide pins next to the flex connector on the front side of the power block.



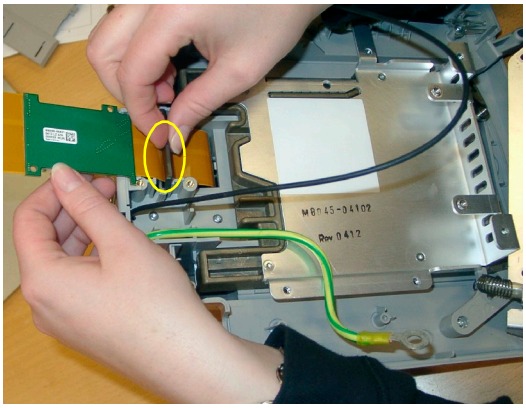
4 Remove the two screws from the bottom cover of the power block.



Reassembly Note: When reassembling the bottom cover of the power block, make sure that the grounding cable , the optic fiber and the flex cable run through the holes provided in the cover.

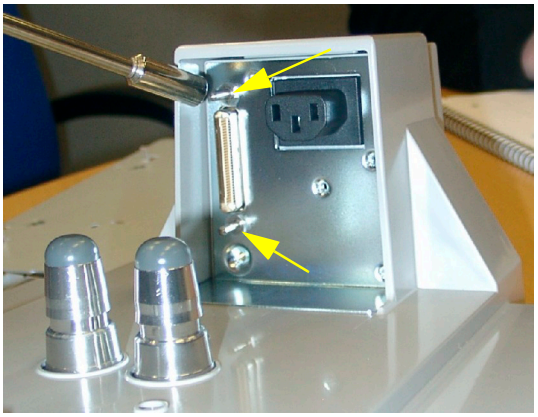


5 Remove the black Split Core and pull out the flex cable from the bottom.



6 Perform the above steps in reverse order to reassemble the docking station.

Reassembly Note: When re-inserting the flex cable it is recommended to secure it with the guide pins immediately.



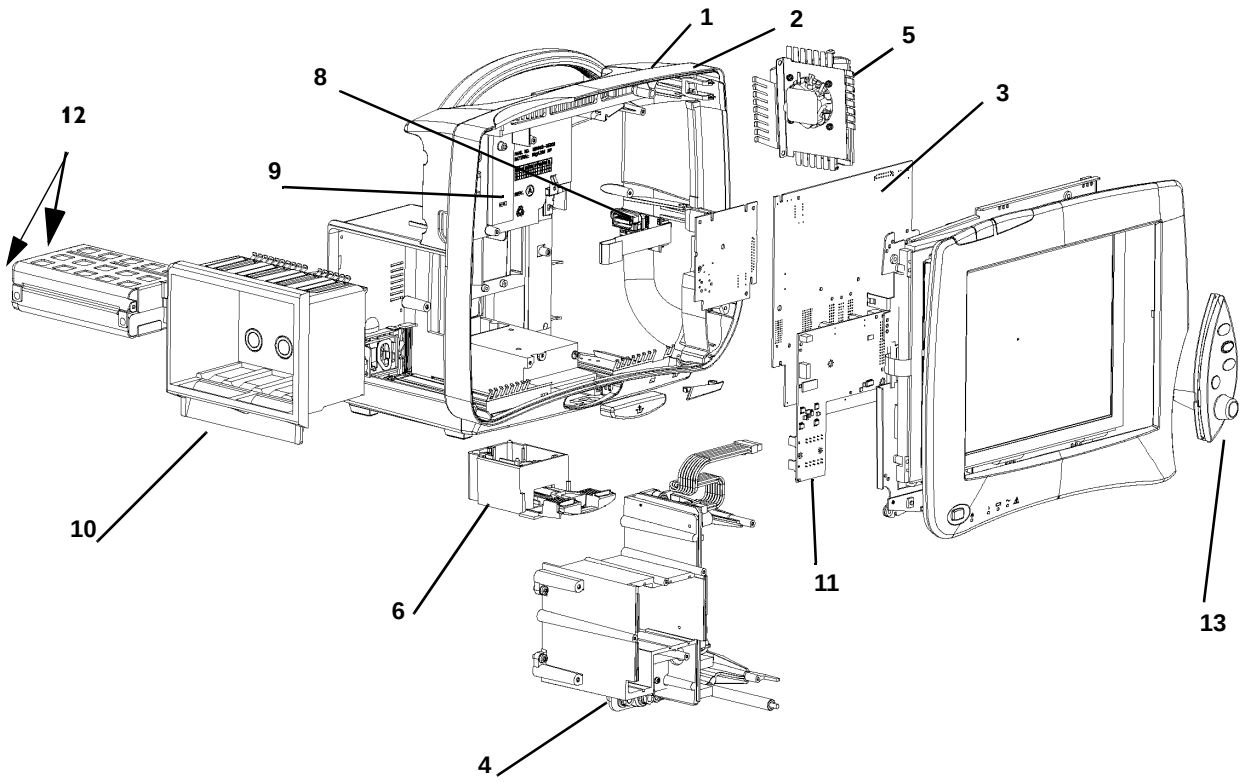
6

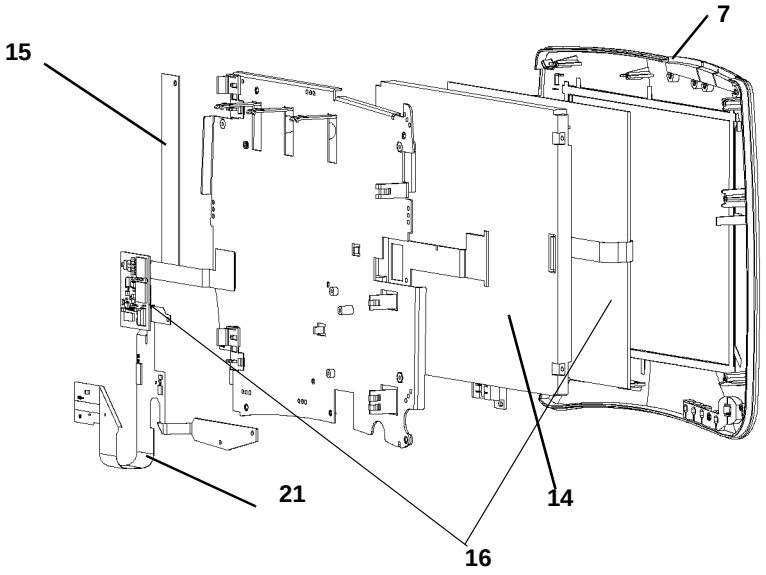
Parts

This section lists the replacement and exchange parts for the following Philips IntelliVue Patient Monitoring System components:

- MP40/MP50 Parts
- Multi-Measurement Server Parts
- Measurement Server Extension Parts (M3012A, M3014A, M3015A and M3016A)
- Plug-in Modules Part Numbers
- Smart Battery Charger Part Numbers
- External Display Part Numbers
- Remote Alarm Device Part Numbers
- Remote Extension Device Part Numbers

MP40/MP50 Parts



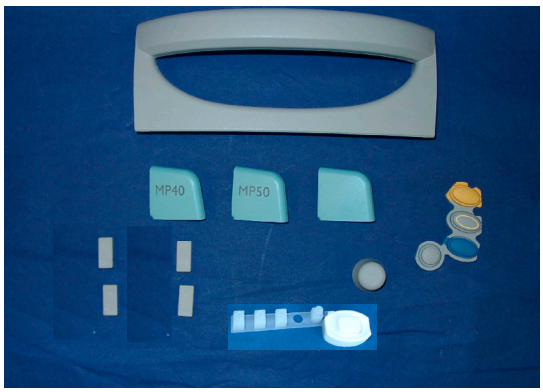


Part Number (used in Production)	Ordering Part Number	Ordering Part Number 12NC	Description	New or Exchange	No. in Diagram
M8003-35201	M8003-69201	453563499101	Rear Housing	New	1
M8003-40504	M8003-69604	453563499161	Frame	New	2
M8052-66401	M8052-69501	453563499171	Main PCB Board	New	3
M8052-66401	M8052-68401	453563499271	Main PCB board	Exchange	3
M8003-60002	M8003-69002	453563499051	Power Supply Assembly	New	4
M8003-60002	M8003-68002	453563499241	Power Supply Assembly	Exchange	4
M8003-60003	M8003-69503	453563499111	Loudspeaker Assembly	New	5
M8003-60021	M8003-69021	453563499091	Quick Release Mount	New	6
M8003-60011	M8003-69011	453563499061	Front Housing	New	7
M8063-67001	M8063-69501	453563499191	MSL Assembly	New	8
M8085-66421	M8085-69521	453563499221	ECG Out/Alarm Board	New	9
M8003-60004	M8003-69504	453563499121	4 Slot Rack Assembly	New	10
M8067-66401	M8067-69501	453563499201	Battery Board	New	11
M8067-66401	M8003-68401	453563499281	Battery Board	Exchange	11
M8003-64005	M8003-64005	451261003001	Battery Kit (incl. two M4605A batteries)	New	12
M8003-60013	M8003-69013	453563499081	Navigation Point Assembly English	New	13
M8003-60012	M8003-69012	453563499071	Navigation Point Assembly Symbol	New	13
M8003-64600	M8003-69600	453563499141	Display	New	14
M8003-64004	M8003-64004	453563499021	Backlight Inverter Kit	New	15
M8003-64001	M8003-69001	453563499041	Touch Controller Board & Touch Panel	New	16
M8003-64602	M8003-69602	453563499151	Screen Panel (non-touch)	New	n/a
M8090-67021	M8003-69521	453563499131	System Interface Board standard	New	n/a
M8090-67001	M8090-69501	453563499231	System Interface Board advanced	New	n/a
M8090-67041	M8090-67541	451261009781	Docking System Interface Board MP40/50	New	
M8003-64603	M8003-64603	453563499031	Backlight Tubes	New	n/a
M8078-66401	M8078-69401	453563499211	Flat Panel Adapter - Flex	New	21
n/a	M8081-67501	453563469621	I/F; Dual MIB/RS232	New	n/a
n/a	M8082-67501	453563469631	I/F; Centronics Printer	New	n/a
n/a	M8086-67501	453563469651	I/F; HIF, Integral, PS/2	New	n/a
n/a	M8087-67501	453563469681	I/F; Flexible Nurse Call Relay	New	n/a
n/a	M8086-67521	453563469661	Remote I/F	New	n/a

Part Number (used in Production)	Ordering Part Number	Ordering Part Number 12NC	Description	New or Exchange	No. in Diagram
M8003-64002	M8003-64002	453563499001	Small Parts Kit 1 incl.: 1x Lightpipe Holder 1x Loudspeaker Cover 1x Cover 4 Slot Rack 1x Battery Plastic Barrier 1x MMS Snap Lock 1x Release Button Cap 1x Battery Door 1x Internal Rack 2x plastic backlight cable strain relief 1x MSL cable 1x Connector Holder 10x Screws Torx M3x6 10x Screws Torx M3x10 10x Screws Torx M3x8 self-tapping 5x Screws Torx M4x10 10x Screws Torx M3x4	New	n/a
M8003-64003	M8003-64003	453563499011	Small Parts Kit 2 incl.: 1x Key Silicon Trimknob 1x Knob Trimknob 1x Silicon Key Power On/Off 1x Feet 1x Cover Branding Blank 1x Cover Branding MP40 1x Cover Branding MP50 1x Handle	New	n/a



Small Parts Kit 1



Small Parts Kit 2

Part Number	12 NC Part Number	Description
M8043A	989803135881	External Battery Charger

Multi-Measurement Server Parts

The Multi-Measurement Server does not contain any servicable parts and can only be replaced in its entirety.

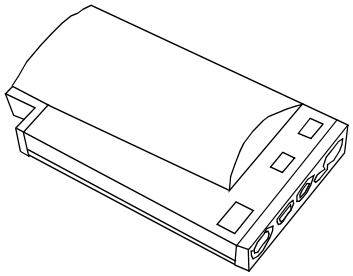


Figure 11 M3001A Multi-Measurement Server

Exchange Multi-Measurement Servers are shipped with English front bezels only. If you require a bezel in another language (compare the part numbers of your language to the English ones to check this) the front bezel has to be ordered additionally. Attach the appropriate bezel before putting the MMS into operation.

MMS Part Numbers - Front Bezel for M3001#A01

Language	Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead Option #C12	Conventional 12 Lead & Pressure/Temp Extension Option #C18
English	M3001-64101 453563462481	M3001-44101 453563462661	M3001-64101 453563462481	M3001-44101 453563462661
French	M3001-64102 453563462491	M3001-44102 453563462671	M3001-64102 453563462491	M3001-44102 453563462671
German	M3001-64103 453563462501	M3001-44103 453563462681	M3001-64103 453563462501	M3001-44103 453563462681
Dutch	M3001-64104 453563462511	M3001-44104 453563462531	M3001-64104 453563462511	M3001-44104 453563462531
Spanish	M3001-64105 453563462521	M3001-44105 453563462541	M3001-64105 453563462521	M3001-44105 453563462541
Italian	M3001-64106 453563462381	M3001-44106 453563462551	M3001-64106 453563462381	M3001-44106 453563462551
Norwegian	M3001-64107 453563462391	M3001-44107 453563462561	M3001-64107 453563462391	M3001-44107 453563462561
Swedish	M3001-64108 453563462401	M3001-44108 453563462571	M3001-64108 453563462401	M3001-44108 453563462571
Finnish	M3001-64109 453563462411	M3001-44109 453563462581	M3001-64109 453563462411	M3001-44109 453563462581
Japanese	M3001-64101 453563462481	M3001-44101 453563462661	M3001-64101 453563462481	M3001-44101 453563462661
Danish	M3001-64111 453563462421	M3001-44111 453563462591	M3001-64111 453563462421	M3001-44111 453563462591
Traditional Chinese	M3001-64101 453563462481	M3001-44101 453563462661	M3001-64101 453563462481	M3001-44101 453563462661
Simplified Chinese	M3001-64101 453563462481	M3001-44101 453563462661	M3001-64101 453563462481	M3001-44101 453563462661
Portuguese	M3001-64114 453563462431	M3001-44114 453563462601	M3001-64114 453563462431	M3001-44114 453563462601
Greek	M3001-64115 453563462441	M3001-44115 453563462611	M3001-64115 453563462441	M3001-44115 453563462611
Turkish	M3001-64101 453563462481	M3001-44101 453563462661	M3001-64101 453563462481	M3001-44101 453563462661

Language	Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead Option #C12	Conventional 12 Lead & Pressure/Temp Extension Option #C18
Russian	M3001-64117 453563462451	M3001-44117 453563462621	M3001-64117 453563462451	M3001-44117 453563462621
Hungarian	M3001-64101 453563462481	M3001-44101 453563462661	M3001-64101 453563462481	M3001-44101 453563462661
Czech	M3001-64119 453563462461	M3001-44119 453563462631	M3001-64119 453563462461	M3001-44119 453563462631
Polish	M3001-64120 453563462471	M3001-44120 453563462641	M3001-64120 453563462471	M3001-44120 453563462641
Slovak	M3001-64101 453563462481	M3001-44101 453563462661	M3001-64101 453563462481	M3001-44101 453563462661
Korean	M3001-64101 453563462481	M3001-44101 453563462661	M3001-64101 453563462481	M3001-44101 453563462661

MMS Part Numbers - Front Bezel for M3001#A02

Language	Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead & Pressure/Temp Extension Option #C18
English	M3001-64201 451261005631	M3001-44201 451261005481	M3001-44201 451261005481
French	M3001-64202 451261005641	M3001-44202 451261005491	M3001-44202 451261005491
Spanish	M3001-64205 451261005671	M3001-44205 451261005521	M3001-44205 451261005521
Japanese	M3001-64201 451261005631	M3001-44201 451261005481	M3001-44201 451261005481

Language	Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead & Pressure/Temp Extension Option #C18
Russian			
Hungarian	M3001-64201 451261005631	M3001-44201 451261005481	M3001-44201 451261005481
Czech			
Polish			
Slovak	M3001-64201 451261005631	M3001-44201 451261005481	M3001-44201 451261005481
Korean	M3001-64201 451261005631	M3001-44201 451261005481	M3001-44201 451261005481

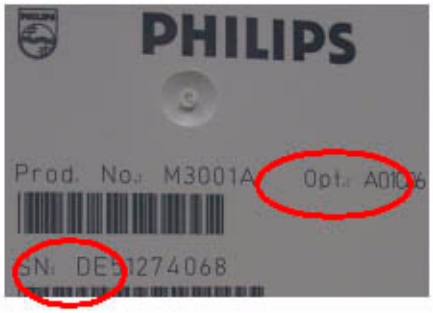
MMS Exchange Part Numbers

NOTE The MMS always ships with the latest Software Revision. In order to make it compatible with the respective monitor the MMS may need to be upgraded or downgraded. From Support Tool version E.03.01 onwards the MMS can be up- or downgraded with every support tool license key (except general).

M3001A #A01 Philips FAST SpO_2 MMS Exchange Numbers

Language		Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead Option #C12	Conventional 12 Lead & Pressure/Temp Extension Option #C18
English Text	Exchange Part No. 12NC	M3001-68102 453563462911 or M3001-68114 451261006041 or M3001-68105 451261013041	M3001-68202 453563486921 or M3001-68204 451261006061 or M3001-68205 451261013061	M3001-68302 453563486931 or M3001-68304 451261006081	M3001-68402 453563486941 or M3001-68404 451261006101 or M3001-68405 451261013081
	New Part No. 12NC	M3001-60105 451261013051	M3001-60205 451261013071	M3001-60304 451261006091	M3001-60405 451261013091
Symbol (International)	Exchange Part No. 12NC	M3001-68502 453563486951 or M3001-68504 451261006121 or M3001-68505 451261013101	M3001-68602 453563486961 or M3001-68604 451261006141 or M3001-68605 451261013121	M3001-68702 453563486971 or M3001-68704 451261006161	M3001-68802 453563486981 or M3001-68804 451261006181 or M3001-68805 451261013141
	New Part No. 12NC	M3001-60505 451261013111	M3001-60605 451261013131	M3001-60704 451261006171	M3001-60805 451261013151

The exchange MMS to be ordered depends on the hardware revision of the current MMS. Order the exchange MMS according to the following criteria:



Serial Number Prefix **DE441** and **DE227** indicate hardware revision A.

Serial Number Prefix	Exchange MMS to be ordered
DE227xxxxx DE441xxxxx	M3001-68x**02**

Serial Number Prefix **DE512** indicates hardware revision B.

Option	Serial Number Prefix	Exchange MMS to be ordered
A01	DE512xxxxx	M3001-681**14**
A01C06 A01C12 A01C18	DE512xxxxx	M3001-68x**04**

Serial Number Prefix **DE610** indicates hardware revision C.

Option	Serial Number Prefix	Exchange MMS to be ordered
A01 A01C06 A01C18	DE610xxxxx	M3001-68x**05**

M3001A #A02 Nellcor OxiMAX-compatible MMS Exchange Numbers

Language		Basic	Pressure/Temp Extension Option #C06	Conventional 12 Lead & Pressure/Temp Extension Option #C18
English Text	Exchange Part No. 12NC	M3001-68113 451261005361	M3001-68203 451261005381	M3001-68403 451261005401
	New Part No. 12NC	M3001-60113 451261005371	M3001-60203 451261005391	M3001-60403 451261005411
Symbol (International)	Exchange Part No. 12NC	M3001-68503 451261005421	M3001-68603 451261005441	M3001-68803 451261005461
	New Part No. 12NC	M3001-60503 451261005431	M3001-60603 451261005451	M3001-60803 451261005471

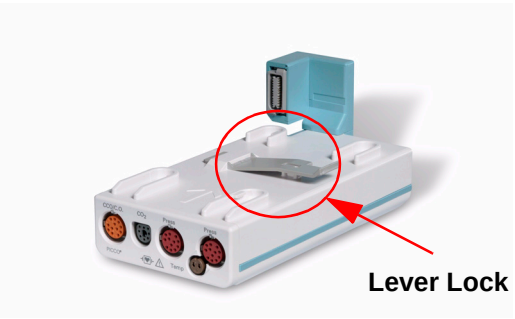
MMS Part Numbers - Label Kits

Part Number	12NC Part Number	Description
M3001-64003	451261001191	Label Kit Alarm Symbols for MMS

MMS Part Numbers - Release Mechanisms

Part Number	12NC Part Number	Description
M3014-64200	451261012731	MMS Extension clips and springs (10 each) for MMS extension release mechanism (old version)
M3001-64600	451261012721	MMS Extension lever locks.(packet of 5) for MMS extesnion release mechanism (new version)

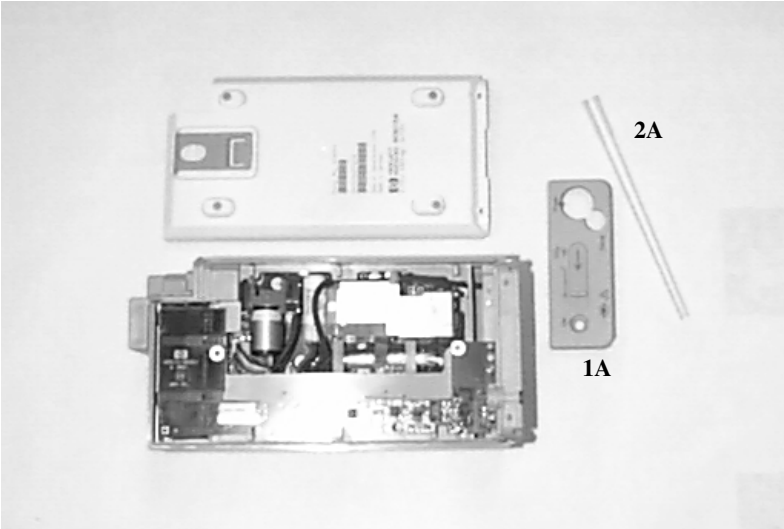




Measurement Server Extension Parts (M3012A, M3014A, M3015A and M3016A)

Exchange Multi-Measurement Server Extensions are shipped with English front bezels only. If you require a bezel in another language (compare the part numbers of your language to the English ones to check this) the front bezel has to be ordered additionally. Attach the appropriate bezel before putting the MMS extension into operation.

The part numbers in the following parts table below, are used to order parts from your Philips representative. The item numbers correspond to the illustration which follows.



Part Number	12NC Part No.	Description	Item
M3012A #C00 - Pressure, Temp & Press/Temp			
M3012-64131	451261000221	M3012A Front Bezel (Pressure, Temp, Press/Temp), English (also for Danish, French, Italian, Simplified Chinese, Traditional Chinese, Japanese)	Not shown
M3012-64133	451261000231	M3012A Front Bezel (Pressure, Temp, Press/Temp), German	Not shown
M3012-64134	451261000241	M3012A Front Bezel (Pressure, Temp, Press/Temp),, Dutch	Not shown
M3012-64135	451261000251	M3012A Front Bezel (Pressure, Temp, Press/Temp), Spanish	Not shown
M3012-64137	451261000261	M3012A Front Bezel (Pressure, Temp, Press/Temp), Norwegian	Not shown
M3012-64138	451261000271	M3012A Front Bezel (Pressure, Temp, Press/Temp), Swedish	Not shown
M3012-64139	451261000281	M3012A Front Bezel (Pressure, Temp, Press/Temp), Finnish	Not shown
M3012-64144	451261000291	M3012A Front Bezel (Pressure, Temp, Press/Temp), Portuguese	Not shown
M3012-64145	451261000301	M3012A Front Bezel (Pressure, Temp, Press/Temp), Greek	Not shown
M3012-64147	451261000311	M3012A Front Bezel (Pressure, Temp, Press/Temp), Russian	Not shown
M3012-64149	451261000321	M3012A Front Bezel (Pressure, Temp, Press/Temp), Czech	Not shown
M3012-64150	451261000331	M3012A Front Bezel (Pressure, Temp, Press/Temp), Polish	Not shown
M3012A #C05 - Cardiac Output, Pressure, Temp & Press/Temp			
M3012-44131	451261000361	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), English (also for Danish, Italian, Simplified Chinese, Traditional Chinese, Japanese)	not shown
M3012-44132	451261000371	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), French	not shown
M3012-44133	451261000381	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), German	not shown
M3012-44134	451261000391	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Dutch	not shown
M3012-44135	451261000401	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Spanish	not shown
M3012-44137	451261000411	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Norwegian	not shown
M3012-44138	451261000421	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Swedish	not shown
M3012-44139	451261000431	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Finnish	not shown
M3012-44144	451261000441	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Potuguese	not shown

Part Number	12NC Part No.	Description	Item
M3012-44145	451261000451	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Greek	not shown
M3012-44147	451261000461	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Russian	not shown
M3012-44149	451261000471	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Czech	not shown
M3012-44150	451261000481	M3012A Front Bezel (C:O, Press, Temp, Press/Temp), Polish	not shown
M3012A #C10 - Cardiac Output, Continuous Cardiac Output, Pressure, Temp & Press/Temp			
M3012-44161	451261000511	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), English (also for Danish, Italian, Simplified Chinese, Traditional Chinese, Japanese)	not shown
M3012-44162	451261000521	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), French	not shown
M3012-44163	451261000531	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), German	not shown
M3012-44164	451261000541	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Dutch	not shown
M3012-44165	451261000551	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Spanish	not shown
M3012-44167	451261000561	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Norwegian	not shown
M3012-44168	451261000571	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Swedish	not shown
M3012-44169	451261000581	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Finnish	not shown
M3012-44174	451261000591	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Portuguese	not shown
M3012-44175	451261000601	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Greek	not shown
M3012-44177	451261000611	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Russian	not shown
M3012-44179	451261000621	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Czech	not shown
M3012-44180	451261000631	M3012A Front Bezel (CCO, Press, Temp, Press/Temp), Polish	not shown
M3014A #A01 - Capnography Extension			
M3014-64131	451261009291	M3014A Front Bezel (CO_2 only) all languages	Not shown
M3014A #C05 - Cardiac Output, Mainstream CO_2, Pressure & Press/Temp			
M3014-44131	451261009321	M3014A Front Bezel (C.O., CO_2, Press/Temp), English (also for Danish, Italian, Simplified Chinese, Traditional Chinese, Japanese)	Not shown
M3014-44132	451264009331	M3014A Front Bezel (C.O., CO_2, Press/Temp), French	Not Shown
M3014-44133	451261009341	M3014A Front Bezel (C.O., CO2, Press/Temp), German	Not shown
M3014-44134	451261009351	M3014A Front Bezel (C.O., CO2, Press/Temp),, Dutch	Not shown
M3014-44135	451261009361	M3014A Front Bezel (C.O., CO2, Press/Temp), Spanish	Not shown
M3014-44137	451261009371	M3014A Front Bezel (C.O., CO2, Press/Temp), Norwegian	Not shown
M3014-44138	451261009381	M3014A Front Bezel (C.O., CO2, Press/Temp), Swedish	Not shown
M3014-44139	451261009391	M3014A Front Bezel (C.O., CO2, Press/Temp), Finnish	Not shown
M3014-44144	451261009401	M3014A Front Bezel (C.O., CO2, Press/Temp), Portuguese	Not shown
M3014-44145	451261009411	M3014A Front Bezel (C.O., CO2, Press/Temp), Greek	Not shown
M3014-44147	451261009421	M3014A Front Bezel (C.O., CO2, Press/Temp), Russian	Not shown
M3014-44149	451261009431	M3014A Front Bezel (C.O., CO2, Press/Temp), Czech	Not shown
M3014-44150	451261009441	M3014A Front Bezel (C.O., CO2, Press/Temp), Polish	Not shown
M3014A #C07 - Mainstream CO_2, Pressure & Press/Temp			

Part Number	12NC Part No.	Description	Item
M3014-64161	451261009471	M3014A Front Bezel (CO2, Press, Press/Temp), English (also for Danish, French, Italian, Simplified Chinese, Traditional Chinese, Japanese)	not shown
M3014-64163	451261009481	M3014A Front Bezel (CO2, Press, Press/Temp), German	not shown
M3014-64164	451261009491	M3014A Front Bezel (CO2, Press, Press/Temp), Dutch	not shown
M3014-64165	451261009501	M3014A Front Bezel (CO2, Press, Press/Temp), Spanish	not shown
M3014-64167	451261009511	M3014A Front Bezel (CO2, Press, Press/Temp), Norwegian	not shown
M3014-64168	451261009521	M3014A Front Bezel (CO2, Press, Press/Temp), Swedish	not shown
M3014-64169	451261009531	M3014A Front Bezel (CO2, Press, Press/Temp), Finnish	not shown
M3014-64174	451261009541	M3014A Front Bezel (CO2, Press, Press/Temp), Potuguese	not shown
M3014-64175	451261009551	M3014A Front Bezel (CO2, Press, Press/Temp), Greek	not shown
M3014-64177	451261009561	M3014A Front Bezel (CO2, Press, Press/Temp), Russian	not shown
M3014-64179	451261009571	M3014A Front Bezel (CO2, Press, Press/Temp), Czech	not shown
M3014-64180	451261009581	M3014A Front Bezel (CO2, Press, Press/Temp), Polish	not shown
M3014A #C10 - Cardiac Output, Continuous Cardiac Output, Mainstream CO_2, Pressure & Press/Temp			
M3014-44161	451261009611	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), English (also for Danish, Italian, Simplified Chinese, Traditional Chinese, Japanese)	not shown
M3014-44162	451261009621	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), French	not shown
M3014-44163	451261009631	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), German	not shown
M3014-44164	451261009641	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Dutch	not shown
M3014-44165	451261009651	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Spanish	not shown
M3014-44167	451261009661	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Norwegian	not shown
M3014-44168	451261009671	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Swedish	not shown
M3014-44169	451261009681	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Finnish	not shown
M3014-44174	451261009691	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Portuguese	not shown
M3014-44175	451261009701	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Greek	not shown
M3014-44177	451261009711	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Russian	not shown
M3014-44179	451261009721	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Czech	not shown
M3014-44180	451261009731	M3014A Front Bezel (C.O./CCO, CO_2, Press, Press/Temp), Polish	not shown
M3015A #C06 Sidestream CO_2 with Press/Temp			
M3015-44131	453563332291	M3015A Front Bezel, English (also for French, Danish, Traditional Chinese and Simplified Chinese)	1A
M3015-44133	453563332301	M3015A Front Bezel, German	Not Shown
M3015-44134	453563332311	M3015A Front Bezel, Dutch	Not Shown
M3015-44135	453563332321	M3015A Front Bezel, Spanish	Not Shown
M3015-44136	453563332331	M3015A Front Bezel, Italian	Not Shown

Part Number	12NC Part No.	Description	Item
M3015-44137	453563332341	M3015A Front Bezel, Norwegian	Not Shown
M3015-44138	453563332351	M3015A Front Bezel, Swedish	Not Shown
M3015-44139	453563332361	M3015A Front Bezel, Finnish	Not Shown
M3015-44140	453563332371	M3015A Front Bezel, Japanese	Not Shown
M3015-44144	453563332381	M3015A Front Bezel, Portuguese	Not Shown
M3015-44145	453563332391	M3015A Front Bezel, Greek	Not Shown
M3015-44147	453563332401	M3015A Front Bezel, Russian	Not Shown
M3015-44150	453563332411	M3015A Front Bezel, Polish	Not Shown
M3015A Sidestream CO_2 without Press/Temp			
M3015-44161	453563402591	M3015A Front Bezel without Press/Temp, English	Not Shown
M3015-44163	453563402601	M3015A Front Bezel without Press/Temp, German	Not Shown
M3015-44164	453563402611	M3015A Front Bezel without Press/Temp, Dutch	Not Shown
M3015-44165	453563402621	M3015A Front Bezel without Press/Temp, Spanish	Not Shown
M3015-44166	453563402631	M3015A Front Bezel without Press/Temp, Italian	Not Shown
M3015-44167	453563402641	M3015A Front Bezel without Press/Temp, Norwegian	Not Shown
M3015-44168	453563402651	M3015A Front Bezel without Press/Temp, Swedish	Not Shown
M3015-44169	453563402661	M3015A Front Bezel without Press/Temp, Finnish	Not Shown
M3015-44170	453563402671	M3015A Front Bezel without Press/Temp, Japanese	Not Shown
M3015-44174	453563402681	M3015A Front Bezel without Press/Temp, Portuguese	Not Shown
M3015-44175	453563402691	M3015A Front Bezel without Press/Temp, Greek	Not Shown
M3015-44177	453563402701	M3015A Front Bezel without Press/Temp, Russian	Not Shown
M3015-44180	453563402711	M3015A Front Bezel without Press/Temp, Polish	Not Shown
M3015A Pump Kit And Mounting Pin			
M3015-29303	453563332261	M3015A Pump Kit (including CO_2 scrubber)	Not Shown
5041-8114	453563100081	Mounting Pin for M3015A	2A
M3016A #A01 (Press/Temp with Mainstream CO_2)			
M3016-44131	453563332441	M3016A Front Bezel, English (also for French, Danish, Traditional Chinese and Simplified Chinese)	Not Shown
M3016-44133	453563332451	M3016A Front Bezel, German	Not Shown
M3016-44134	453563332461	M3016A Front Bezel, Dutch	Not Shown
M3016-44135	453563332471	M3016A Front Bezel, Spanish	Not Shown
M3016-44136	453563332481	M3016A Front Bezel, Italian	Not Shown
M3016-44137	453563332491	M3016A Front Bezel, Norwegian	Not Shown
M3016-44138	453563332501	M3016A Front Bezel, Swedish	Not Shown
M3016-44139	453563332511	M3016A Front Bezel, Finnish	Not Shown
M3016-44140	453563332521	M3016A Front Bezel, Japanese	Not Shown
M3016-44144	453563332531	M3016A Front Bezel, Portuguese	Not Shown
M3016-44145	453563332541	M3016A Front Bezel, Greek	Not Shown

Part Number	12NC Part No.	Description	Item
M3016-44147	453563332551	M3016A Front Bezel, Russian	Not Shown
M3016-44150	453563332561	M3016A Front Bezel, Polish	Not Shown
M3016 #A02 (Press/Temp without Mainstream CO_2)			
M3016-44161	453563482951	M3016A Front Bezel, English (also for French, Danish, Traditional Chinese and Simplified Chinese)	Not shown
M3016-44163	453563482961	M3016A Front Bezel, German	Not shown
M3016-44164	453563482971	M3016A Front Bezel, Dutch	Not shown
M3016-44165	453563482981	M3016A Front Bezel, Spanish	Not shown
M3016-44166	453563482991	M3016A Front Bezel, Italian	Not shown
M3016-44167	453563483001	M3016A Front Bezel, Norwegian	Not shown
M3016-44168	453563483011	M3016A Front Bezel, Swedish	Not shown
M3016-44169	453563483021	M3016A Front Bezel, Finnish	Not shown
M3016-44170	453563483031	M3016A Front Bezel, Japanese	Not shown
M3016-44174	453563483041	M3016A Front Bezel, Portuguese	Not shown
M3016-44175	453563483051	M3016A Front Bezel, Greek	Not shown
M3016-44177	453563483061	M3016A Front Bezel, Russian	Not shown
M3016-44179	453563483071	M3016A Front Bezel, Czech	Not shown
M3016-44180	453563483081	M3016A Front Bezel, Polish	Not shown

Exchange Parts List

Exchange parts are parts that have been returned to Philips and reconditioned for further use. Parts offered as exchange parts are in excellent service order according to rigorous Philips standards but offer you a considerable price advantage.

Table 1 Exchange Parts Table.

Part Number	12NC Part No.	Description	Item
M3012-6801A	451261000201	exchange M3012A Measurement Server Extension with Pressure, Temperature, Press/Temp, For all languages apart from Danish, French, Italian, Chinese and Japanese, order also the local language bezel as shown in the previous "List of Parts"	Not shown
M3012-6831A	451261000341	exchange M3012A Measurement Server Extension with Cardiac Output, Pressure, Temperature, Press/Temp, For all languages apart from Danish, Italian, Chinese and Japanese, order also the local language bezel as shown in the previous "List of Parts"	Not shown
M3012-6861A	451261000491	exchange M3012A Measurement Server Extension with Continuous Cardiac Output, Pressure, Temperature, Press/Temp, For all languages apart from Danish, Italian, Chinese and Japanese, order also the local language bezel as shown in the previous "List of Parts"	Not shown
M3014-6801A	451261009281	exchange M3014A Measurement Server Extension with CO_2 For all languages apart from Danish, Italian, Chinese and Japanese, order also the local language bezel as shown in the previous "List of Parts"	Not shown
M3014-6831A	451261009311	exchange M3014A Measurement Server Extension with CO_2, Cardiac Output, Pressure, Press/Temp For all languages apart from Danish, Italian, Chinese and Japanese, order also the local language bezel as shown in the previous "List of Parts"	Not shown
M3014-6891A	451261009461	exchange M3014A Measurement Server Extension with CO_2,Pressure, Press/Temp For all languages apart from Danish, Italian, Chinese and Japanese, order also the local language bezel as shown in the previous "List of Parts"	Not shown
M3014-6861A	451261009601	exchange M3014A Measurement Server Extension with CO_2, Cardiac Output/ Continuous Cardiac Output, Pressure, Press/Temp For all languages apart from Danish, Italian, Chinese and Japanese, order also the local language bezel as shown in the previous "List of Parts"	Not shown

Part Number	12NC Part No.	Description	Item
M3015-6801A	453563332431	exchange M3015A Measurement Server Extension with Pressure/Temperature, English. For all languages apart from French, Danish and Chinese, order also the local language bezel as shown in the previous “List of Parts”.	Not Shown
M3015-6831A	453563477871	exchange M3015A Measurement Server Extension without Pressure/Temperature, English. For all languages apart from French, Danish and Chinese, order also the local language bezel as shown in the previous “List of Parts”	Not Shown
M3016-6801A	453563332581	exchange M3016A Measurement Server Extension with CO_2, English. #A01 For all languages apart from French, Danish and Chinese, order also the local language bezel as shown in the previous “List of Parts”.	Not Shown
M3016-6831A	453563483901	exchange M3016A Measurement Server Extension without CO_2, English. #A02 For all languages apart from French, Danish and Chinese, order also the local language bezel as shown in the previous “List of Parts”	Not shown

Plug-in Modules Part Numbers

For inspection procedures; preventive maintenance procedures; cleaning procedures; and battery handling, maintenance, and good practices used to maintain the instrument in good working order, see *Testing and Maintenance*.

Part Number Table

The following table shows the part-numbers of the plug-in modules that can be replaced.
Find the right number for your language combining the P/N-Prefix with the language-specific suffix for the wanted module. For example, to order a TEMP module for the French language, the correct order number would be M1029-68801.

Exchange Modules, Table 1

Module Number	Module Description	Part # Prefix 12NC Part No. Prefix	English	French	German	Dutch	Spanish	Italian	Norwegian	Swedish	Finnish	Japanese	Danish
M1006B	Inv. Press	M1006-69 45356346	601 3061	601 3061	603 2811	604 1711	605 1781	601 3061	607 1791	608 1731	609 1741	610 1751	601 3061
M1006B #C01	Press with Analog Out	M1006-69 45356346	651 3071	651 3071	653 1241	654 1251	655 1261	651 3071	657 0031	658 0041	659 0051	660 0061	651 3071
M1012A	C.O.	M1012-69 45356345	601 8801	602 8761	603 8771	601 8801	605 8781	601 8801	601 8801	601 8801	601 8801	610 8791	601 8801
M1012A #C10	C.O. with PiCCO extension	M1012-69 45356346	651 3011	652 0941	653 4731	651 3011	655 0311	651 3011	651 3011	651 3011	651 3011	660 0321	651 3011
M1014A	Spiro-metry	M1014-69 45126101	601 4451	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461
M1018A	$tcpO_2$	M1018-69 4535634	601 59211	602 60491	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211	610 58711	601 59211
M1020B #A01	SpO_2 (Philips FAST SpO_2)	M1020-69 4512610	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061
M1020B #A02	SpO_2 (Nellcor Oximax)	M1020-69 4512610	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101
M1020B #A03	Masimo SET IntelliVue Module	M1020-69 4512610	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131
M1027A	EEG	M1027-69 45356345	601 9151	601 9151	601 9151	601 9151	601 9151	601 9151	601 9151	601 9151	601 9151	610 9161	601 9151
M1029A	Temp	M1029-69 4535634	601 59291	601 59291	601 59291	601 59291	601 59291	601 59291	601 59291	601 59291	609 60581	610 60561	601 59291
M1032A #A01	VueLink Auxiliary	M1032-69 45356345	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381
M1032A #A02	VueLink Ventilator	M1032-69 45356345	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391
M1032A #A03	VueLink Gas Analyzer	M1032-69 45356345	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401

Module Number	Module Description	Part # Prefix 12NC Part No. Prefix	English	French	German	Dutch	Spanish	Italian	Norwegian	Swedish	Finnish	Japanese	Danish
M1032A #A04	VueLink Anesthesia Machine	M1032-69 45356345	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411
M1032A #A05	VueLink Auxiliary Plus	M1032-69 45356345	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421
M1034A	BIS	M1034-69 45356346	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841
M1116B	Recorder	M1116-68 45356346	603 6701	606 6731	604 6711	603 6701	605 6721	610 6771	603 6701	607 6741	620 6781	609 6761	603 6701

Exchange Modules, Table 2

Module Number	Module Description	Part # Prefix 12NC Part No. Prefix	Traditional Chinese	Simplified Chinese	Portuguese	Greek	Turkish	Russian	Hungarian	Czech	Polish	Slovak	Korean
M1006B	Inv. Press	M1006-69 45356346	601 3061	613 1761	601 3061	615 1281	601 3061	601 3061	601 3061	619 1291	620 1301	601 3061	601 3061
M1006B #C01	Press with Analog Out	M1006-69 4535634	651 63071	663 59011	664 58321	665 59021	651 63071	651 63071	651 63071	669 59031	670 59041	651 63071	651 63071
M1012A	C.O.	M1012-69 4535634	601 58801	613 58831	602 58761	615 60931	601 58801	601 58801	601 58801	601 58801	601 58801	601 58801	601 58801
M1012A #C10	C.O. with PiCCO extension	M1012-69 45356346	651 3011	663 0331	652 0941	665 0341	651 3011	651 3011	651 3011	651 3011	651 3011	651 3011	651 3011
M1014A	Spiro metry	M1014-69 45126101	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461	602 4461
M1018A	tcpO2	M1018-69 4535634	601 59211	613 60541	614 60551	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211	601 59211
M1020B #A01	SpO_2 (Philips FAST SpO_2)	M1020-69 4512610	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061	651 00061
M1020B #A02	SpO_2 (Nellcor Oximax)	M1020-69 4512610	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101	652 00101

Module Number	Module Description	Part # Prefix 12NC Part No. Prefix	Traditional Chinese	Simplified Chinese	Portuguese	Greek	Turkish	Russian	Hungarian	Czech	Polish	Slovak	Korean
M1020B #A03	Masimo SET IntelliVue Module	M1020-69 4512610	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131	653 00131
M1027A	EEG	M1027-69 4535634	601 59151	601 59151	601 59151	615 60481	601 59151	601 59151	601 59151	601 59151	601 59151	601 59151	601 59151
M1029A	Temp	M1029-69 4535634	601 59291	613 60571	601 59291	615 59891	601 59291	601 59291	601 59291	619 59901	601 59291	601 59291	601 59291
M1032A #A01	VueLink Auxiliary	M1032-69 45356345	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381	801 8381
M1032A #A02	VueLink Ventilator	M1032-69 45356345	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391	802 8391
M1032A #A03	VueLink Gas Analyzer	M1032-69 45356345	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401	803 8401
M1032A #A04	VueLink Anesthesia Machine	M1032-69 45356345	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411	804 8411
M1032A #A05	VueLink Auxiliary Plus	M1032-69 45356345	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421	805 8421
M1034A	BIS	M1034-69 45356346	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841	601 2841
M1116B	Recorder	M1116-68 45356346	603 6701	608 6751	621 6791	603 6701	603 6701	603 6701	603 6701	603 6701	603 6701	603 6701	603 6701

Plug-In Modules Replaceable Parts

The photographs below are examples of the parts listed in the Replaceable Parts table. Depending on the specific module the language and the color of the connector bezel may vary.

Single-Width Plug-In Module

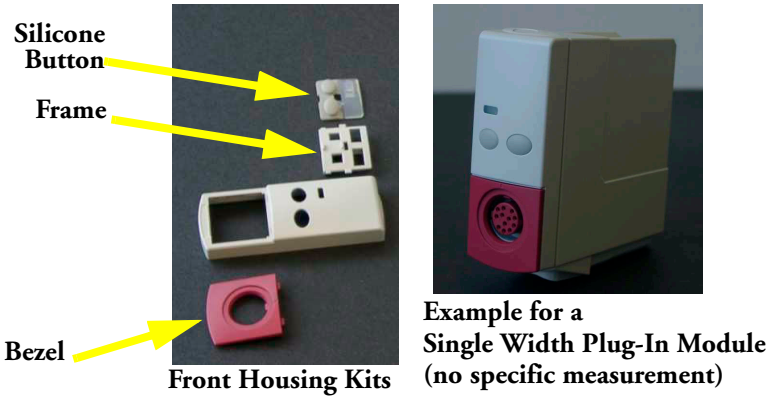


Figure 12 Single-Width Plug-In Module

Double-Width Plug-In Module

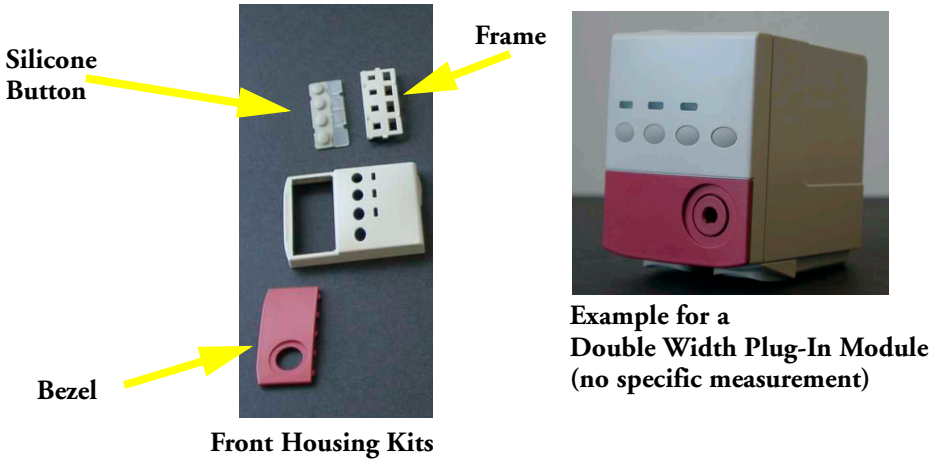


Figure 13 Double-width Plug-in Module

Plug-in Module Replaceable Parts

Part Number	12NC Part No.	Description
M1116-40041	453563243811	TOP HOUSING (FITS M1116 *A* & M1116 *B* MODELS)
M1116-60201	453563243891	M1116B RECORDER CLEANING KIT
M1001-45011	453563490691	SNAP LOCK SINGLE
M1018-60602	453563460501	$tcpO_2/CO_2$CALIBRATION CHAMBER KIT - New Type
M1027-61601	453563231141	EEG MODULE TEST DEVICE

Plug-In Module Language Specific Front Housing Kits (incl. Silicone Buttons, Frames & Bezels), Table 1

Module #	Module Description	Part # Prefix 12NC Part No. Prefix	English	French	German	Dutch	Spanish	Italian	Norwegian	Swedish	Finnish	Japanese	Danish
M1006B	Inv. Press	M1006-60 45356346	201 2101	201 2101	203 2101	204 1581	205 1591	201 2101	207 1601	208 1611	209 1621	210 1631	201 2101
M1006B #C01	Press with Analog Out	M1006-60 45356346	251 2091	251 2091	253 1691	254 1701	255 1711	251 2091	257 1721	258 1821	259 1831	260 1841	251 2091
M1012A	C.O.	M1012-60 45356346	201 2021	202 0161	203 0171	201 2021	205 0181	201 2021	201 2021	201 2021	201 2021	210 0191	201 2021
M1012A #C10	CCO/ C.O. with PiCCO functionality	M1012-60 4535634	251 2031	252 0221	253 0141	251 2031	255 0151	251 2031	251 2031	251 2031	251 2031	260 2051	251 2031
M1014A	Spiro-metry	M1014-60 45126101	201 4491	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501
M1018A	tcpO2	M1018-60 45356346	201 1441	202 2211	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441	210 2221	201 1441
M1020B #A01	SpO_2 (Philips FAST SpO_2)	M1020-60 4512610	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081
M1020B #A02	SpO_2 (Nellcor Oximax)	M1020-60 4512610	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121
M1027A	EEG	M1027-60 45356346	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	210 2131	201 1471

Module #	Module Description	Part # Prefix 12NC Part No. Prefix	English	French	German	Dutch	Spanish	Italian	Norwegian	Swedish	Finnish	Japanese	Danish
M1029A	Temp	M1029-60 45356346	201 1451	201 1451	201 1451	201 1451	201 1451	201 1451	201 1451	201 1451	209 2161	210 2171	201 1451
M1032A	VueLink all Types	M1032-60 45356346	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401
M1034A	BIS	M1034-60 45356346	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411
M1116B	Recorder	M1116-60 4535634	203 62301	206 62321	204 89221	203 62301	205 62311	210 62351	203 62301	207 89231	220 89241	209 62341	203 62301

Plug-In Module Language Specific Front Housing Kits (incl. Silicone Buttons, Frames & Bezels), Table 2

Module#	Module Description	Part # Prefix 12NC Part No. Prefix	Traditional Chinese	Simplified Chinese	Portuguese	Greek	Turkish	Russian	Hungarian	Czech	Polish	Slovak	Korean
M1006B	Inv. Press	M1006-60 45356346	201 2101	213 1641	214 1651	215 1661	201 2101	201 2101	201 2101	219 1671	220 1681	201 2101	201 2101
M1006B #C01	Press with Analog Out	M1006-60 45356346	251 2091	263 1851	264 1861	265 1871	251 2091	251 2091	251 2091	269 1881	270 1891	251 2091	251 2091
M1012A	C.O.	M1012-60 45356346	201 2021	213 0201	202 0161	215 0211	201 2021	201 2021	201 2021	201 2021	201 2021	201 2021	201 2021
M1012A #C10	CCO/ C.O. with PiCCO function-ality	M1012-60 45356346	251 2031	263 2061	252 0221	265 2041	252 0221	252 0221	252 0221	252 0221	252 0221	252 0221	252 0221
M1014A	Spiro-metry	M1014-60 45126101	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501	202 4501
M1018A	tcpO2	M1018-60 45356346	201 1441	213 2231	214 2241	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441	201 1441
M1020B #A01	SpO_2 (Philips FAST SpO_2)	M1020-60 4512610	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081	251 00081

Module#	Module Description	Part # Prefix 12NC Part No. Prefix	Traditional Chinese	Simplified Chinese	Portuguese	Greek	Turkish	Russian	Hungarian	Czech	Polish	Slovak	Korean
M1020B #A02	SpO_2 (Nellcor Oximax)	M1020-60 4512610	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121	252 00121
M1027A	EEG	M1027-60 45356346	201 1471	201 1471	201 1471	215 2141	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471	201 1471
M1029A	Temp	M1029-60 45356346	201 1451	213 2181	201 1451	215 2191	201 1451	201 1451	201 1451	219 2201	201 1451	201 1451	201 1451
M1032A	VueLink all Types	M1032-60 45356346	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401	201 1401
M1034A	BIS	M1034-60 45356346	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411	201 1411
M1116B	Recorder	M1116-60 4535634	203 62301	208 62331	221 89251	203 62301	203 62301	203 62301	203 62301	203 62301	203 62301	203 62301	203 62301

Plug-In Module Specific Bezels

Module#	Module Description	Bezel Part#	12NC Part No.
M1006B	Inv. Press	M1006-42202	453563456611
M1012A	C.O.	M1012-42201	453563463241
M1014A	Spirometry	M1014-42201	451261014511
M1016A	CO2 Mainstream	M1016-42201	453563463231
M1018A	tcpO2	M1018-42201	453563463651
M1027A	EEG	M1027-42201	453563463611
M1029A	Temp	M1029-42201	453563456691
M1032A	VueLink	M1032-42201	453563456701
M1034A	BIS	M1034-42201	453563463661

BIS Solution Replaceable Parts

Exchange Part Number	New Part Number	Description	
n/a	M1034-61630 453563233721	BIS PIC (PATIENT INTERFACE CABLE)	14
n/a	M1034-61650 453563233731	BIS SENSOR SIMULATOR	

Exchange Part Number	New Part Number	Description	
M1034-68520 453563233761	M1034-60020 453563233661	BIS ENGINE	12
M1034-68102 453563233741	M1034-60102 453563233681	BIS DSC-XP	13
n/a	M1034-61610 453563233701	BIS MODULE CABLE (0.8 m)	11
n/a	M1034-61620 453563233711	BIS MODULE CABLE (2.0 m)	11

BIS Solution Components

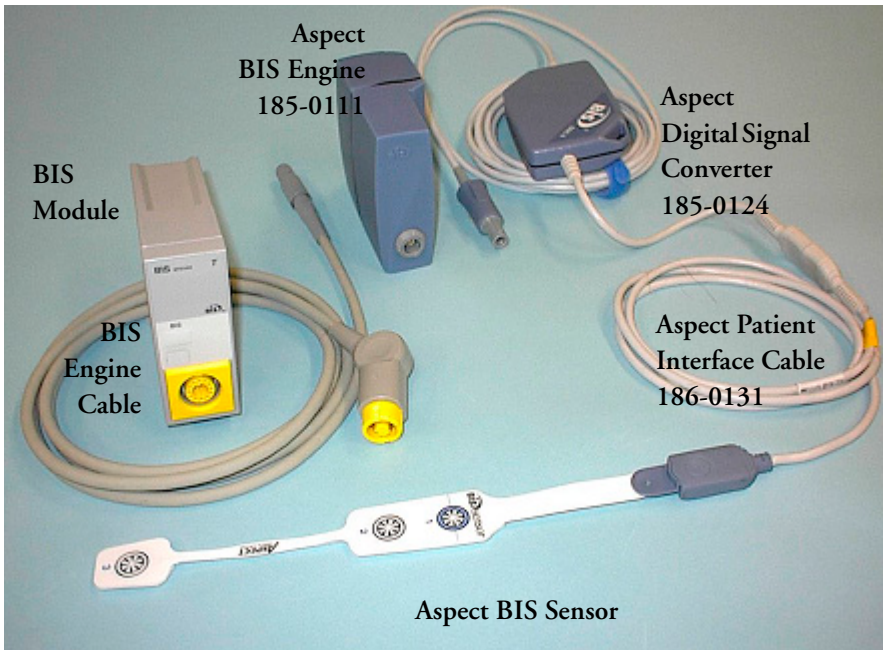


Figure 14 BIS Solution Components with BIS Engine and DSC

BISx Solution Replacable Parts

Exchange Part Number	New Part Number	Description
n/a	M1034-61630 453563233721	BIS PIC (Patient Inetrface Cable)
n/a	M1034-61650 453563233731	BIS Sensor Simulator
M1034-68521 451261003621	n/a	BISx Power Link
n/a	M1034-61660	BISx Host Cable

Exchange Part Number	New Part Number	Description
n/a	M1034-47600	BISx bulkhead connector
M1034-68500	n/a	BIS Interface Module
453563233751		

BISx Solution Components

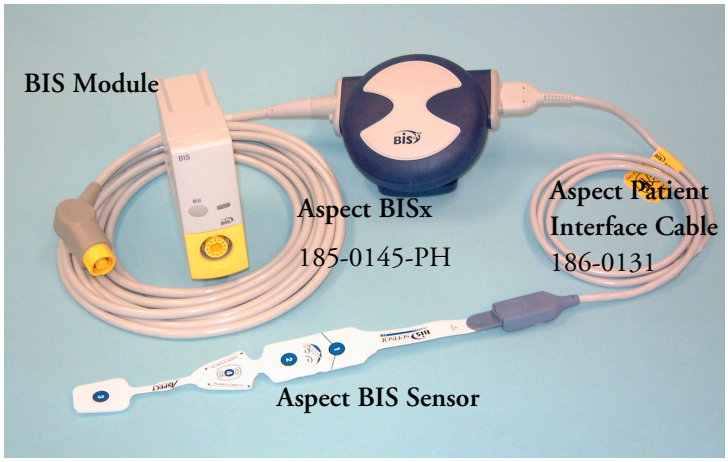


Figure 15 BISx Solution

$tcpO_2/tcpCO_2$ Module Accessories

The following accessories can be ordered for the $tcpO_2/tcpCO_2$ Module:

Table 2 $tcpO_2/tcpCO_2$ Monitoring Accessories

New Part Number	12 NC Part No.	Description
15209-60010	989803100801	Accessory Kit
15210-60010	989803100821	CAL 1 gas (6 bottles - U.S.A. only)
15210-64010	989803100841	CAL 1 gas (6 bottles)
15210-60020	989803100831	CAL 2 gas (6 bottles - U.S.A. only) Contains: 0% O_2, 10% CO_2
15210-64020	989803100851	CAL 2 gas (6 bottles) Contains: 0% O_2, 10% CO_2
M1918A	989803105521	$tcpO_2/CO_2$ Transducer
M2205A	989803105991	Calibration Tubing (5x)

Smart Battery Charger Part Numbers

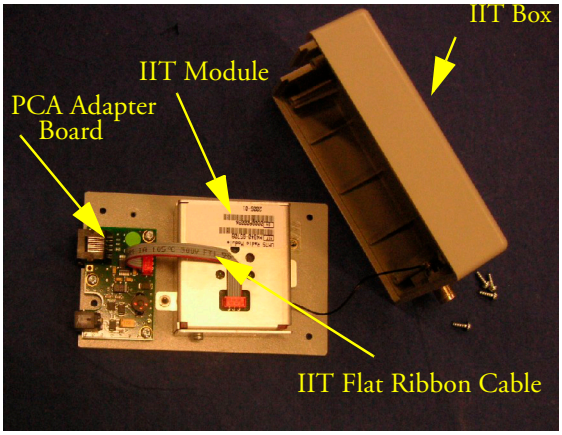
Table 3 Exchange Assemblies

Exchange Part No.	12NC (Exch.)	New Part No.	12NC (New)	Description
M8043-68000	453563498911	M8043-60000	453563498901	Exchange Smart Battery Charger

Table 4 Non-Exchange Assemblies

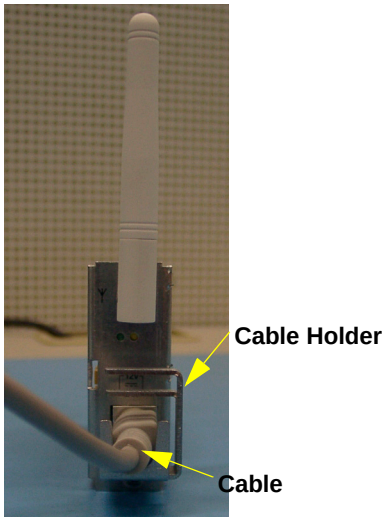
Exchange Part No.	12NC (Exch.)	Description
M8043-60010	451261001281	Replacement Kit: Air Fan & 2 Filter Mats
M8043-60011	451261001291	Replacement Kit: 2 Filter Mats

IntelliVue Instrument Telemetry Part Numbers



Part Number (used in Production)	Ordering Part Number	Ordering Part Number 12NC	Description	New or Exchange
M4840-65708	M4840-65508	451261009031	IIT Module (incl. antenna cable)	New
M4840-65708	M4840-68708	451261009041	IIT Module (incl. antenna cable)	Exchange
M8058-61001	M8058-61001	451261007891	IIT Flat Ribbon Cable	New
M8090-66491	M8090-66591	451261007901	PCA Adapter Board ITT	New
M8003-45201	M8003-45201	451261007911	ITT Box	New
M8080-61001	M8080-61001	453563484581	Y-Cable	New
M4842-61300	M4842-61300	453564007571	Antenna	New

IntelliVue 802.11 Bedside Adapter Part Numbers*



Part Number (used in Production)	Ordering Part Number	Ordering Part Number 12NC	Description	New or Exchange
M8096-67011	M8096-67511	451261013021	IntelliVue 802.11 Bedside Adapter incl. cable and cable holder	New
M8096-67011	M8096-68011	451261013031	IntelliVue 802.11 Bedside Adapter incl. cable and cable holder	Exchange
M2639-61001	M2639-61001	451261013011	Cable Assembly	New
0955-1495	0955-1495	451261013001	Antenna WLAN Tri-band	New

* In order to use the MP80/90 with the IntelliVue 802.11 Bedside Adapter, you must install a cover rear I/O board with revision 0549 or higher.

Docking Station Part Numbers

Part Number (used in Production)	Ordering Part Number	Ordering Part Number 12NC	Description	New or Exchange
M8045-60001	M8045-60501	451261009741	Docking Station	New
M8045-60001	M8045-68001	451261009751	Docking Station Exchange	Exchange
M8098-67001	M8098-67501	451261009761	Main Board Docking	New
M8098-66421	M8098-66421	451261009771	Flex Cable Docking Station	New

External Display Part Numbers



Figure 16 M8031A and M8031B External XGA Displays

Table 5 External XGA Display Parts

Product Number	Part Number	12NC Part No.	Description
M8031A	M1097-60004	453563241661	15” Dual Mode XGA Color Touch Screen Display
	M1097-68004	453563241761	Exchange 15” Dual Mode XGA Color Touch Screen Display.
	M1097-64001	453563241731	Power Supply Mounting Clamp for M1097A.
	M1097-01201	453563241611	Mounting Bracket for M1097A.
	M1097-60005	453563241671	Power Supply.
	M1097-61604	453563241721	Adapter Cable.
	M1097-04702	453563241631	Desk Stand for M1097A Display.
M8031B	M8031-60001	451261001911	15” Medical Grade Display with Touch
	M8031-68001	451261001941	Exchange 15” Medical Grade Display with Touch
	M8031-60005	451261001921	Power Supply 12V for M8031B Display
	M8031-64001	451261001931	Power Supply Mounting for M8031B Display
	M8031-04701	451261001901	Monitor Desk Stand for M8031B/M8033C
	2090-0860	453563463201	Backlights for M8031B



Figure 17 M8033A and M8033B External SXGA Displays



Figure 18 M8033C External SXGA Display

Table 6 External SXGA Display Parts

Product Number	Part Number	12NC Part No.	Description
M8033A	M8033-60001	453563480941	17” SXGA Color Touch Screen Display
	M8033-68001	453563480951	Exchange 17” SXGA Color Touch Screen Display.
	M8033-64001	453563480971	Power Supply Bracket Mount
	M8033-60005	453563480961	Power Supply.
	M8033-04701	453563480981	Desk Stand for M8033A and M8033B Display.
M8033B	M8033-60002	451261006271	M8033B New 17” Medical Grade Display with Touch
	M8033-68002	451261006281	M8033B Exchange 17” Medical Grade Display with Touch
	M8033-60006	451261006291	Power Supply 12V for M8033B Display
	M8033-64002	451261006301	Power Supply Mounting for M8033B Display
	M8033-04701	453563480981	Monitor Desk Stand for M8033A and M8033B Display
M8033C	M8033-60071	451261009151	M8033C New 17” Medical Grade Monitor with Touch
	M8033-68071	451261009161	M8033C Exchange 17” Medical Grade Monitor with Touch
	M8031-04701	451261001901	Monitor Desk Stand for M8031B/M8033C
	M8033-64603	451920880311	Backlights for M8033C

Remote Alarm Device Part Numbers

The Remote Alarm Device contains no servicable parts and can only be replaced in its entirety (part number M8025-60501 (12NC: 453563469801)). For cable part numbers please see the Site Preparation section.



Figure 19 Remote Alarm Device Front and Rear View

Remote Extension Device Part Numbers

The Remote Extension Device contains no servicable parts and can only be replaced in its entirety (part number: M8026-60504 (12NC: 453563469821)). For cable part numbers, please see the Site Preparation section.



Figure 20 Remote Extension Device Front and Rear View

7

Installation Instructions

The information contained in this chapter should enable the MP40/MP50 to be installed ready for use (the preparation and planning should be adhered to as specified in the *Site Preparation* section). Configuration of the system is explained in the Configuration Guide.

Unpacking the Equipment

Your equipment will arrive in a carton similar to the ones pictured below. All components of the monitoring system are consolidated into a single packing crate. The contents of this crate depend on the options you have purchased. In addition to the monitor it can contain the following:

- MMS and user manuals
- Parameter modules
- Measurement server extensions and accessories



Figure 21 Accessory and Monitor Packaging

In the unlikely event of a defect on arrival, please keep the packing materials until you have completed the initial inspection.

Initial Inspection

Mechanical Inspection

Open the shipping container(s) and examine each part of the instrument for visible damage, such as broken connectors or controls, or scratches on the equipment surfaces. If the shipping carton/container is undamaged, check the cushioning material and note any signs of severe stress as an indication of rough handling in transit. This may be necessary to support claims for hidden damage that may only become apparent during subsequent testing.

Electrical Inspection

The instrument has undergone extensive testing prior to shipment. Safety testing at installation is not required (except in situations where devices are interconnected forming a system, see “Connecting Non-Medical Devices” on page 225). An extensive self check may be performed. This recommendation does not supercede local requirements.

All tests are described in the *Testing and Maintenance* section of this manual.

Claims For Damage and Repackaging

Claims for Damage

When the equipment is received, if physical damage is evident or if the monitor does not meet the specified operational requirements of the patient safety checks or the extended self check, notify the carrier and the nearest Philips Sales/Support Office at once. Philips will arrange for immediate repair or replacement of the instrument without waiting for the claim settlement by the carrier.

Repackaging for Shipment or Storage

If the instrument is to be shipped to a Philips Sales/Support Office, securely attach a label showing the name and address of the owner, the instrument model and serial numbers, and the repair required (or symptoms of the fault). If available and reusable, the original Philips packaging should be used to provide adequate protection during transit. If the original Philips packaging is not available or reusable please contact the Philips Sales/Support Office who will provide information about adequate packaging materials and methods.

Installing the Monitor (M8003A or M8004A)

NOTE There are different mounting options available for the monitor. This section covers the general concepts of safe mount installations and specific steps for the mounting options sold by Philips. Instructions which ship with a mounting solution should always take precedence over the instructions described in this chapter.

You MUST follow the instructions that ship with the mounting solution, regardless of manufacturer.

Mounting Instructions

Assembling Mounts

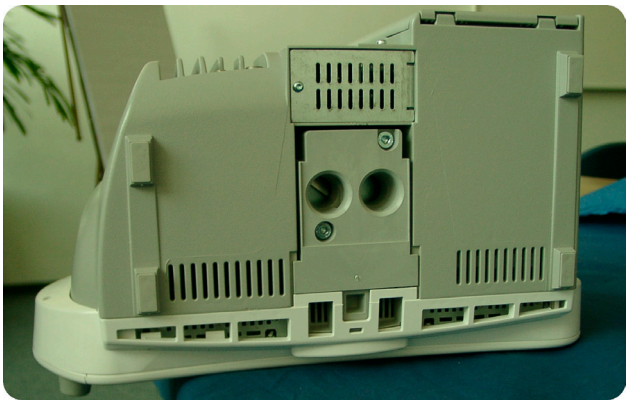




Figure 22 Table Mount (M4046-64100, 12NC: 451261001381))

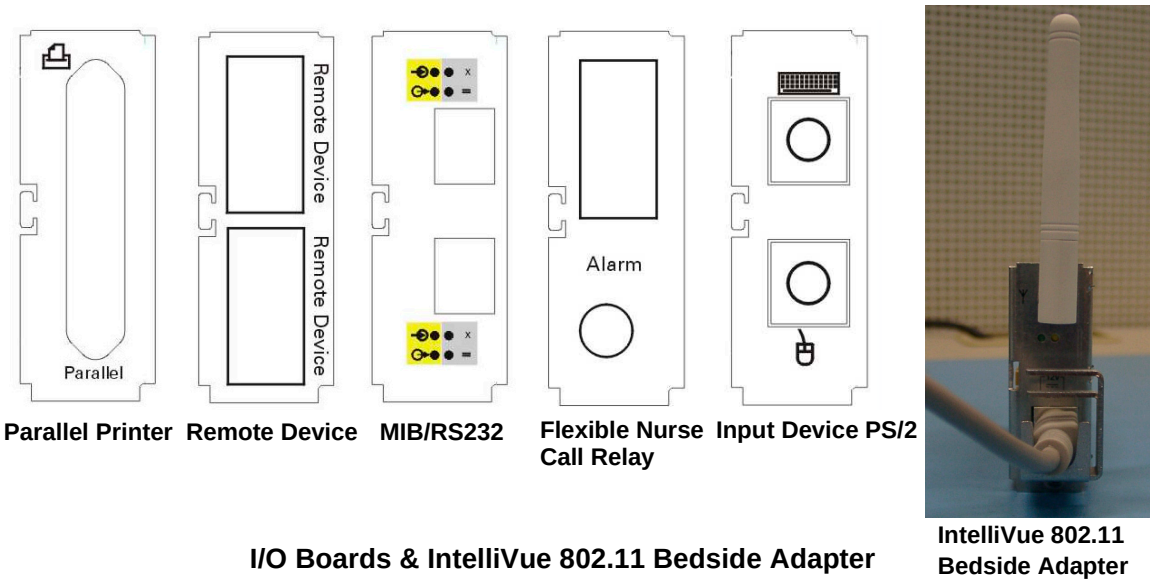
The table mount ships with the monitor. Every type of compatible mounting solution is delivered with a complete set of mounting hardware and instructions. Refer to the documentation delivered with the mounting hardware for instructions on assembling mounts.

WARNING It is the customer's responsibility to have the attachment of the mounting hardware to the ceiling, wall, or mounting rail and the construction of the ceiling, wall, or mounting rail evaluated for structural integrity and compliance with all local, state and any other required codes by a registered, professional, structural and/or mechanical engineer.

Ensure that this commitment has been met before assembling mounts.

Connections

The following figure shows the cable and interface board connections.



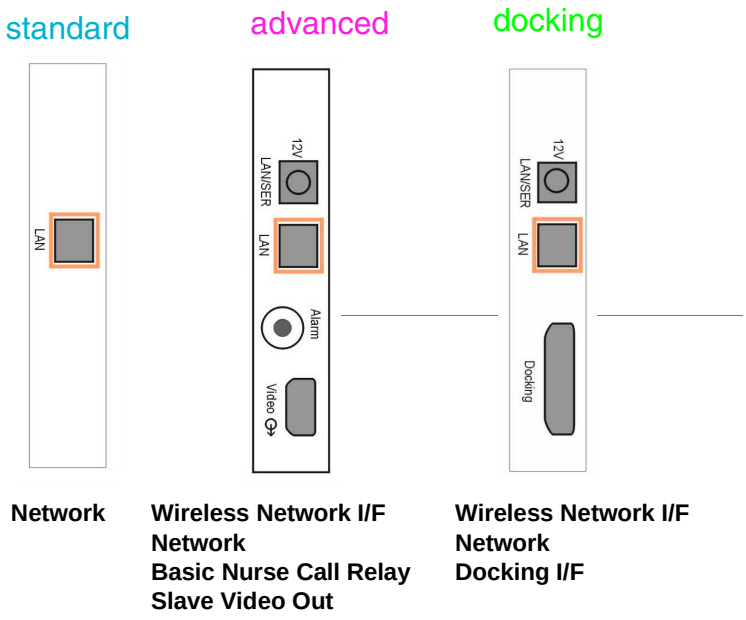
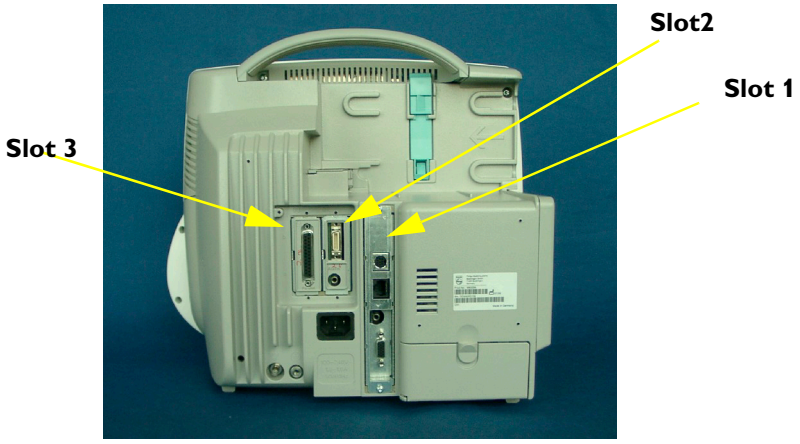


Figure 23 MP40/MP50 Cable and Interface Board Connections

Installing Interface Boards

If you add interface boards to your monitor, you must insert them into the device according to the following rules:



- The following boards can be inserted into **slot 1**:
 - System Interface Board Standard
 - System Interface Board Advanced
 - Docking System Interface Board
- The following boards can be inserted into either **slot 2** or **slot 3**:
 - PS/2 (Input Device) Interface
 - Remote Interface
 - Parallel printer
 - Nurse Call Relay
 - MIB/RS232
 - IntelliVue 802.11 Bedside Adapter

NOTE Only one of each of the boards listed above can be installed at a time except the MIB/RS232 board, of which a second board is allowed.

NOTE Connections to the Remote Interface Board must be made as follows: the remote alarm device must be connected to the upper port and the remote input device to the lower port of the board.

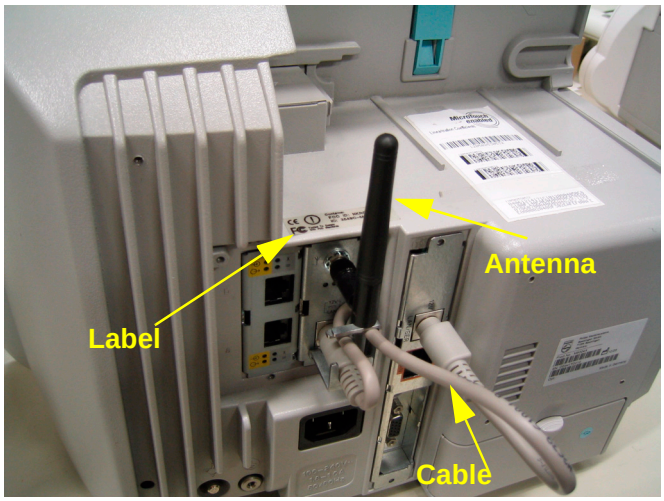
The following table shows possible configurations for the MP40/50 patient monitors:

I/O Board		Possible Configurations														
Name	**Possible I/O slots**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
802.11 Bedside Adapter	02, 03	02	02	02	02	02	-	-	-	-	-	-	-	-	-	-
Input Device Interface	02,03	03	-	-	-	-	02	02	02	02	-	-	-	-	-	-
Remote Device IInterface	02,03	x	03	-	-	-	03	-	-	-	02	02	02	-	-	-
Parallel Printer Interface	02,03	x	x	03	-	-	x	03	-	-	03	-	-	02	-	-
Nurse Call Relay	02,03	x	x	x	03	-	x	x	03	-	x	03	-	03	02	-
MIB/RS232 (2x)	02,03	x	x	x	x	03	x	x	x	03	x	x	03	x	03	03
2nd MIB/ RS232 (2x)	02,03	x	x	x	x	x	x	x	x	x	x	x	x	x	-	02

"-" This board is assumed to not be required for this configuration
"x" This board cannot be assigned in this configuration

NOTE Ensure that the board removal tool is snapped properly into place inside the battery compartment door after each use.

If you have installed #J35 (IntelliVue 802.11 Bedside Adapter) please attach the approval label or the WLAN label for Japan (country specific) and the antenna and connect the cable from the 802.11 Bedside Adapter to the wireless port as shown below.



NOTE The installation of #J35 requires a wireless system interface board.

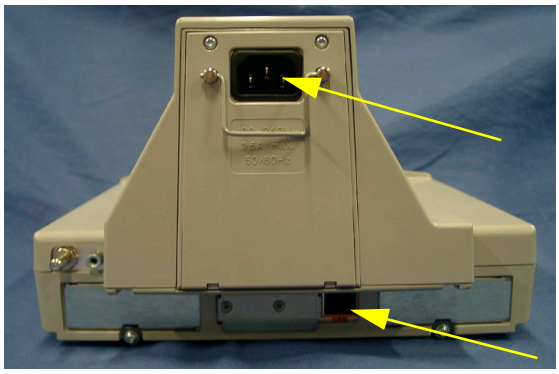
Connection of Devices via the MIB/RS232 Interface

The configuration of a specific MIB/RS232 port can be viewed in config mode and altered in service mode. This is required, for example, when a slave display with touchscreen is installed. To alter the configuration of an MIB port select **`Main Setup`** then **`Hardware`** then **`Setup MIB/RS232.`**

NOTE Be aware that if you change a port assignment this assignment is not reset upon boot up. If the MIB/RS232 board is removed and replaced with a different type of board the settings are deleted. If the MIB/RS232 board is then refitted, you must reconfigure the MIB/RS232 port. The configuration of MIB/RS232 is not cloned between services.

Installing the Docking Station

Make the power connection and the LAN connection to the docking station as shown in the photograph below.



When using a D80 Intelligent Display, any M8048A Flexible Measurement Server connected to the system must have software revision C.0 or higher.

Installing Remote Devices

This section provides instructions for Philips products. Installation instructions for devices not sold by Philips must be provided by the device manufacturer.

Mounting the 15” Remote Display (M8031A)

The Philips M8031A Color Flatscreen Display can be used with the MP40/MP50 monitor as a slave display. A bracket is supplied with the display to connect it to a variety of Philips mounting devices.

A - Removing the desktop stand (if installed):

1 Remove the covers from the screws on the back of the flatscreen display

2 Remove the four screws from the back cover of the display and detach the cover.

3 Remove the four screws from the desktop stand and detach the desktop stand.

B - Attaching the bracket:

1 Place the bracket on the back of the display with the slits facing upwards.

2 Attach the bracket to the display with four M4x8 screws.

3 Attach the desired mounting device to bracket.

NOTE Do not mount the display in a position where liquid could spill onto it.

Connections

Connect the cables to the display as shown in the photograph.

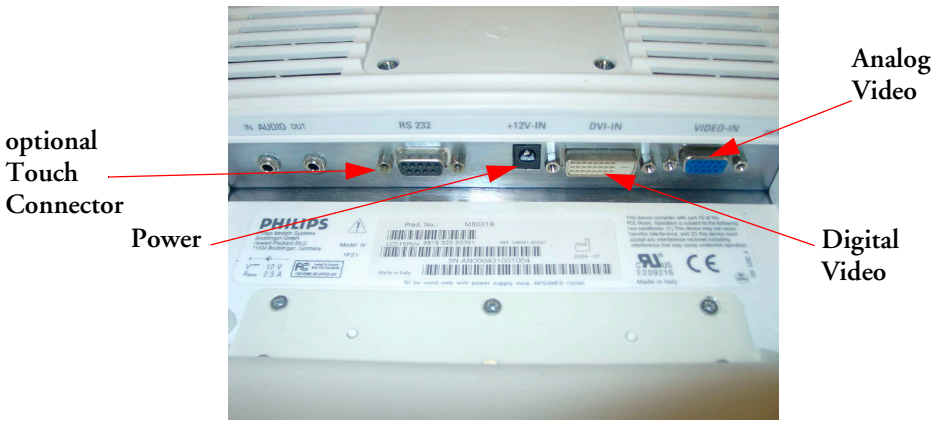


Mounting the 15” Remote Display (M8031B)

Mounting solutions for the M8031B must be purchased separately. Please refer to the installation instructions which ship with the mounting solution purchased.

Connections

Connect the cables to the display as shown in the photographs below.



Mounting the 17” Remote Display (M8033A/B/C)

Mounting solutions for the M8033A/B/C must be purchased separately. Please refer to the installation instructions which ship with the mounting solution purchased.

Connections

Connect the cables to the display as shown in the photographs below.



Figure 24 Connections M8033A

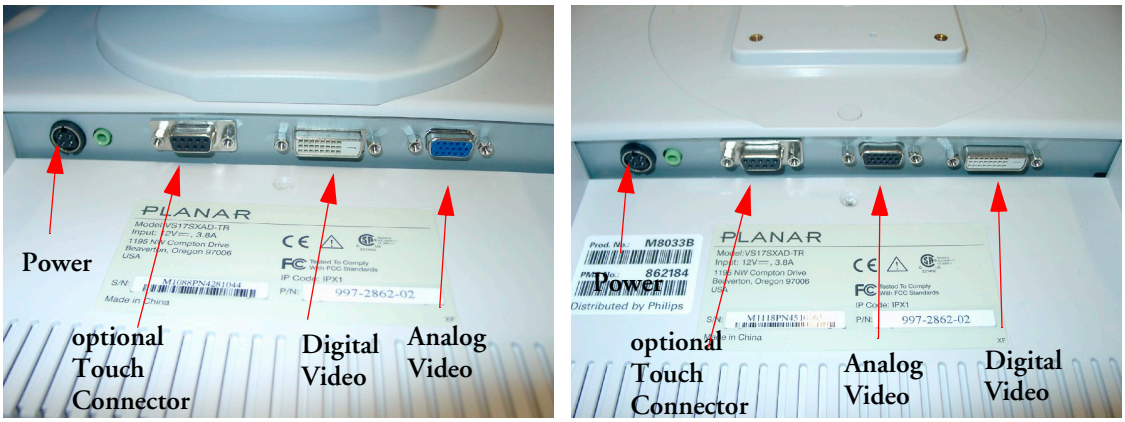


Figure 25 Connections M8033B (old and new version)

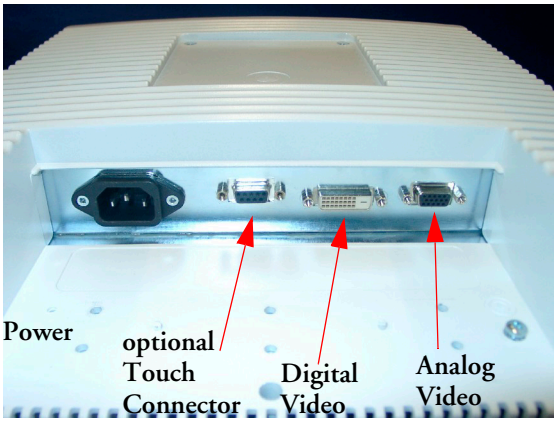
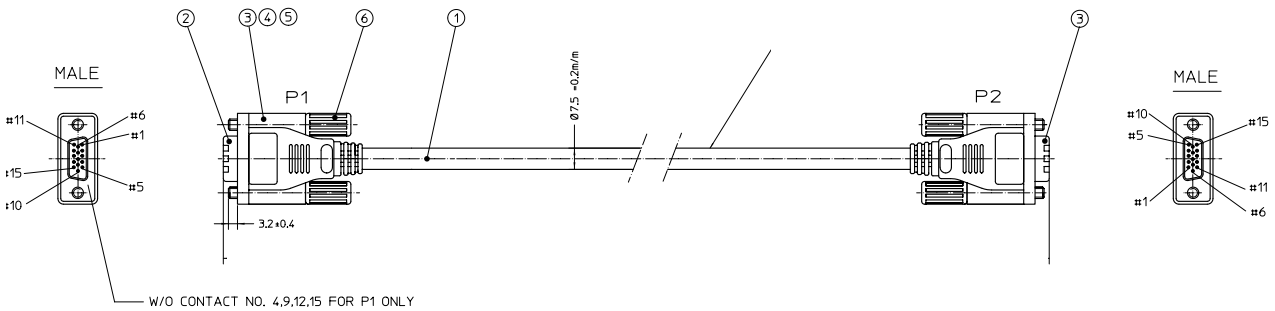


Figure 26 Connections M8033C

Video Cable Wiring Schematics



CIRCUIT DIAGRAM		
P1	WIRE	P2
1	RED COAX. CENTER	1
2	GREY COAX. CENTER	2
3	BLUE COAX. CENTER	3
5	BLACK	5
10		10
6	RED COAX. SHIELD	6
7	GREY COAX. SHIELD	7
8	BLUE COAX. SHIELD	8
11	BROWN	11
13	YELLOW	13
14	WHITE	14
SHELL	OVER SHIELD	SHELL

Figure 27 Analog Video Cable Wiring Schematic

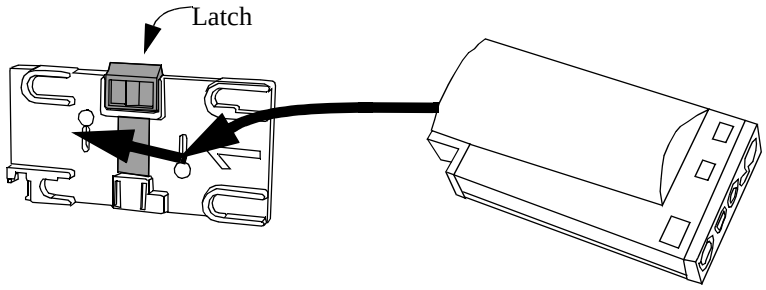
Multi-Measurement Server

Attaching the MMS to a Mount

1 Make sure the Measurement Server is oriented correctly relative to the mount (see the picture below).

2 Place the Measurement Server on the back mount. If it is not tight against the mount, slip it in the direction of the measurement connectors until it is.

3 Slip the Measurement Server forward until it clicks into place.



Detaching the Measurement Server from a Mount

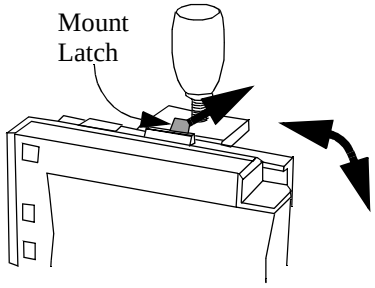
1 Press and hold the latch (in the middle at the top of the mount) away from the Measurement Server.

2 Slide the Measurement Server off the mount in the direction of the measurement connectors.

Positioning the Measurement Server on a Clamp Mount

If you have your Measurement Server on the clamp mount, you can have it in one of four positions. You can reposition it as follows:

1 Press and hold the mount latch toward the clamp screw.

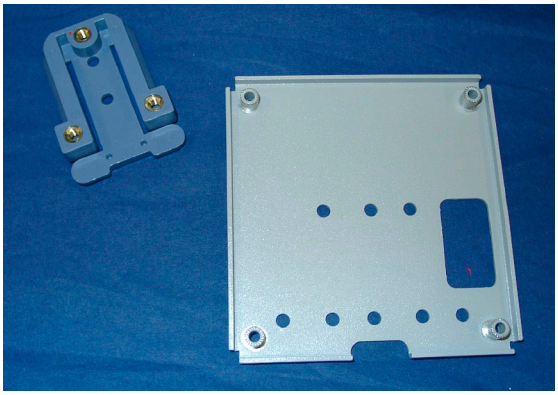


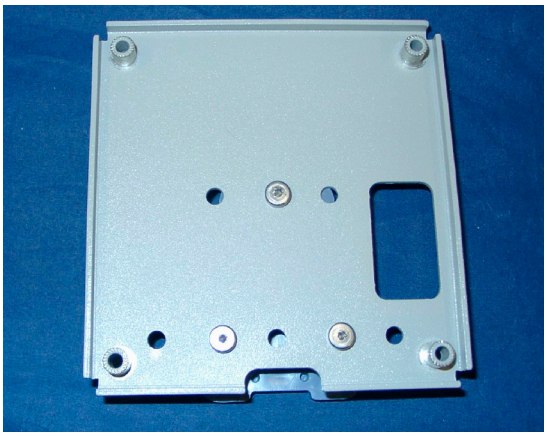
Rotate the Measurement Server and mount until you get it to the position you want.

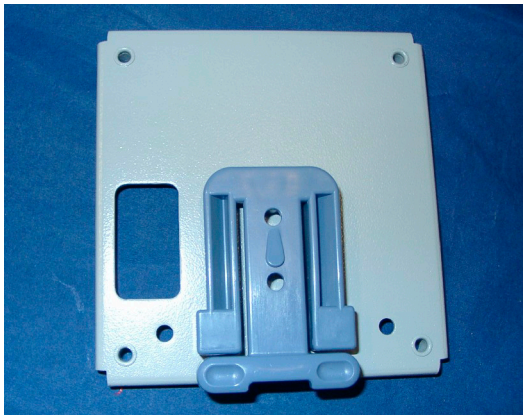
2 Release the mount latch, and make sure it is clicked into one of the four slots on the back of the mount.

Mounting the BIS Engine to the Monitor

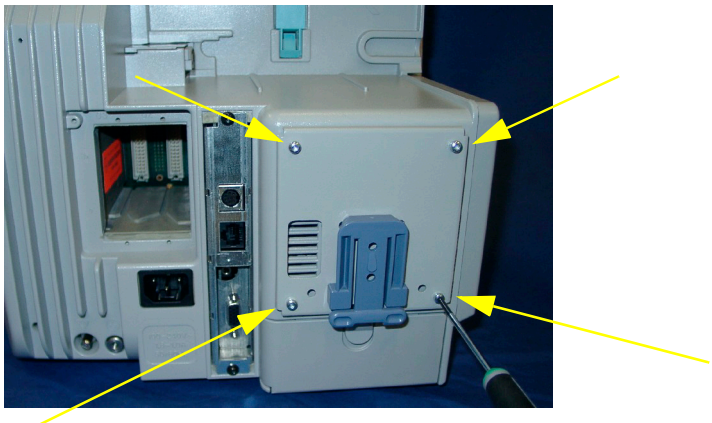
1 Attach the mounting bracket of the BIS Engine to the BIS mount.



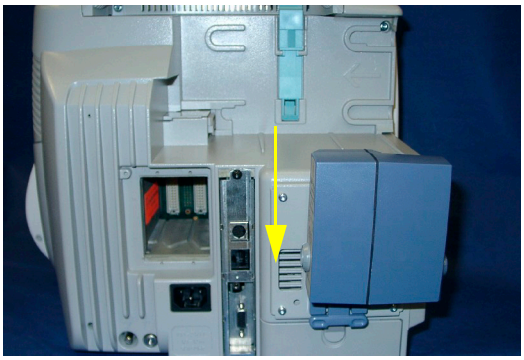




2 Attach the BIS mount to the back of the monitor with four M3x12 screws.



3 Slide the BIS Engine onto the bracket.





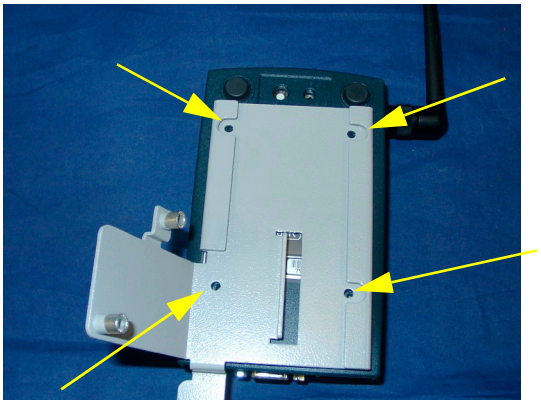
Mounting the Wireless Ethernet Adapter to the Monitor

NOTE The MP40/50 with the IntelliVue Instrument Telemetry adapter complies with part 15 of the Federal Communications Commission (FCC) Rules. Operation is subject to the condition that these devices do not cause harmful interference. Operation of this equipment requires the prior coordination with a frequency coordinator designated by the FCC for the Wireless Medical Telemetry Service.

NOTE The following procedure applies to the Proxim wireless ethernet adapter and the IIT adapter only. To install the IntelliVue 802.11 Bedside Adapter, please refer to the section on installing interface boards.

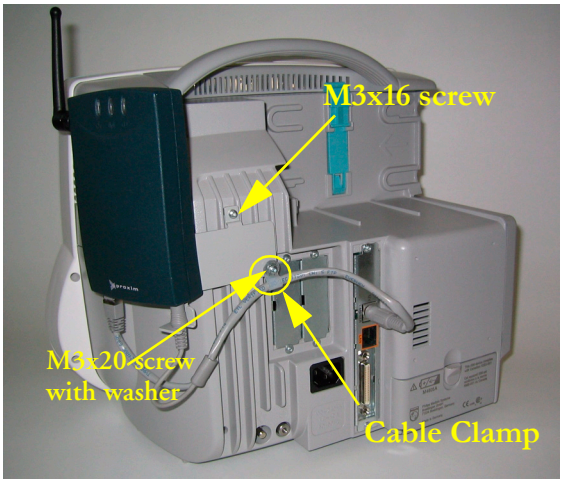
1 Plug in the cable connection between the Proxim Wireless Ethernet Adapter or the IntelliVue Instrument Telemetry (IIT) Adapter and the monitor.

2 Attach the Wireless Ethernet Adapter or the IIT Adapter to the mounting device with four screws (Wireless Ethernet Adapter: 0.6 - 32 x 0.25, IIT: M3x8).

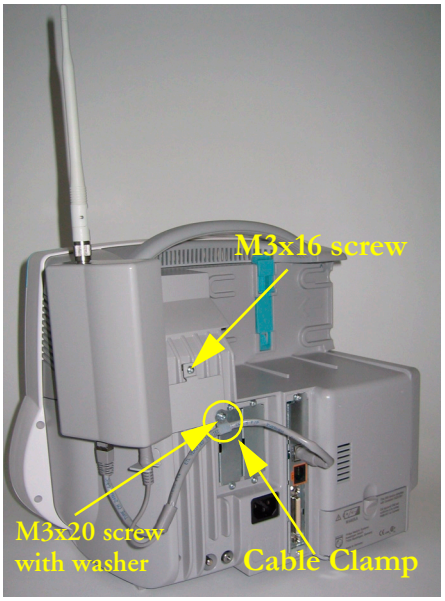


Cable not shown in the picture,
Picture shows Proxim wireless ethernet adapter only

3 Insert the cable into the cable clamp as shown below and then attach the mounting device and the cable clamp to the monitor using an M3x16 screw and an M3x20 screw with washer for the cable clamp.



Proxim Wireless Ethernet Adapter



IIT Adapter

Frequency Coordination (USA only):

Frequency coordination is a registration and coordination process for wireless medical telemetry devices used in the U.S.A. which operate in the FCC-allocated Wireless Medical Telemetry Service (WMTS) bands (608-614 MHz, 1395-1400 MHz, 1427-1432 MHz). The M8001/2A #J45 and the M8004/5A with the IntelliVue Instrument Telemetry adapter M2638A operate in both of the 1395-1400 and 1427-1432 MHz bands.

Under U.S. Federal Communications Commission (FCC) rules, authorized healthcare providers must register their WMTS devices with an authorized Frequency Coordinator designated by the FCC. The American Society for Healthcare Engineering (ASHE) is the current designated Frequency Coordinator.

Registration/Coordination is a two-step process.

Step 1: Registration: Register the healthcare facility on-line, from the ASHE website (www.ashe.org). Click on the link for Wireless Medical Telemetry Service and come to the registration page. Fill out the details, and pay the associated fee as per the instructions provided. You will receive confirmation of this registration. Confirmation must be received before proceeding to the next step.

Step 2: Frequency Coordination: Along with confirmation of registration, you will receive access information necessary to perform this second step, frequency coordination. This step involves logging the equipment and frequencies used into the FCC's database, so as to identify any existing potential interference and to help prevent potential future interference. Coordination is accomplished via the ASHE website. Click on the links for Wireless Medical Telemetry Service and then Frequency Coordination. The way the coordination process is executed as of today, it will need to be repeated twice for the M4840A system; once for the 1395-1400 MHz band, and then again for the 1427-1432 MHz band, both of which are used concurrently by the Philips product. There is a separate fee for each coordination request, which varies between $250 and $2000, depending upon the number of transmitting devices used and the band/s of operation. Coordination is executed by a company named Comsearch, on behalf of ASHE.

To fill in the frequency coordination forms, you'll need to know the following:

- The county.
- Latitude and longitude that represents the center of the area where the transmitting devices will be deployed. Comsearch can help provide this information; www.comsearch.com provides contact information.
- The name/s of the Clinical Unit/s using the devices (e.g. ICU4, CCU-West, ER1, Step-Down North, etc)
- The radius of deployment, expressed in meters. Imagine drawing a circle around the center of the clinical unit, that encloses/encompasses the unit. What is its radius?
- The number of the highest floor on which a transmitting device will operate.
- How many transmitting devices will be used, i.e. the total number of M8001/2A #J45 and M2638A IntelliVue Instrument Telemetry adapter devices combined.
- The Effective Radiating Power: 6.3 mW.
- The Equipment Manufacturer: Philips Medical Systems.
- The Model numbers: M8001/2A #J45 (MP20/30) and M2638A IntelliVue Instrument Telemetry adapter used with M8004/5A (MP40/50)

- The Frequency Range to be used: Two separate coordinations are required: For the first one, click on the range of 1395.0 through 1400.0 MHz. For the second one, click on all the frequency ranges listed in the range of 1427.0 through 1432.0 MHz.

When both Registration and Frequency Coordination have been successfully completed, the IntelliVue Instrument Telemetry System can be activated. Note that this process is the responsibility of the customer, as the final "operator" of the transmitting equipment.

Connections

The cable specifications and part numbers for through wall solutions of the M3001A are described in the *Site Preparation* section of this manual.

MSL Cable Termination

The following installation procedure describes how to install the wall installation cable kit when the patient monitor and the measurement server are not located at the same site. The kit consists of two connector boxes and a cable (15m or 25m).

For this procedure you need the insertion tool (M3086-43801) and a small screwdriver.

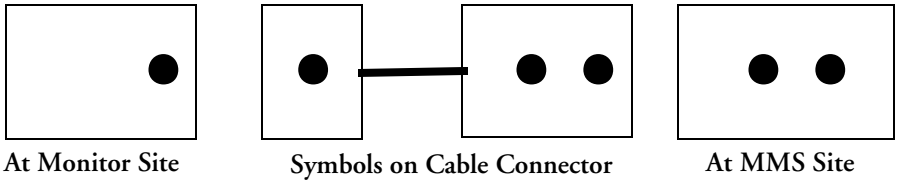
1 Draw the MSL cable through the wall from the site of the monitor to the site of the measurement server.

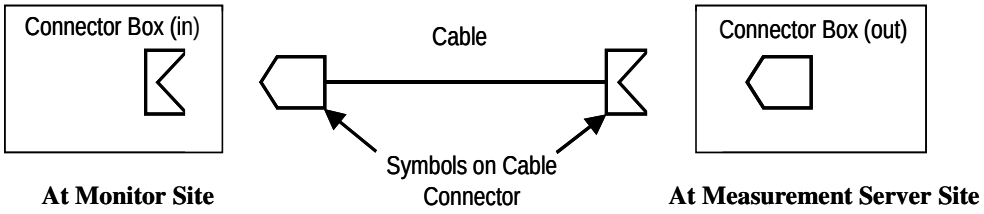
Each MSL face plate kit contains two connector boxes; one in-going and one out-going. (The US version contains an additional rectangular wall-mounting plate).

NOTE The installation procedure is the same for both connector boxes. This means you must perform steps 3 to 8 of this procedure twice.

The connectors on each box are different, so you must ensure that the correct box is placed at the correct location. The dots on the plastic angled cover indicates at which site you should install the box:

:





If there are no dots on the cover, symbols are used:

Symbol:  is connector box (in) and must be placed at the monitor site.

Symbol:  is connector box (out) and must be placed at the measurement server site.

The correct connector cable (M3081-61601, M3081-61602 or M3081-61603) has the opposite symbol:

2 Detach the PCB assembly (in/out) from the metallic mounting flange.

3 Use the Insertion Tool (M3086-43801) to position each wire on the PCB according the wiring schematic in Figure 28, where each color corresponds to a number.

NOTE The Insertion Tool should be set to cutting mode &= on.

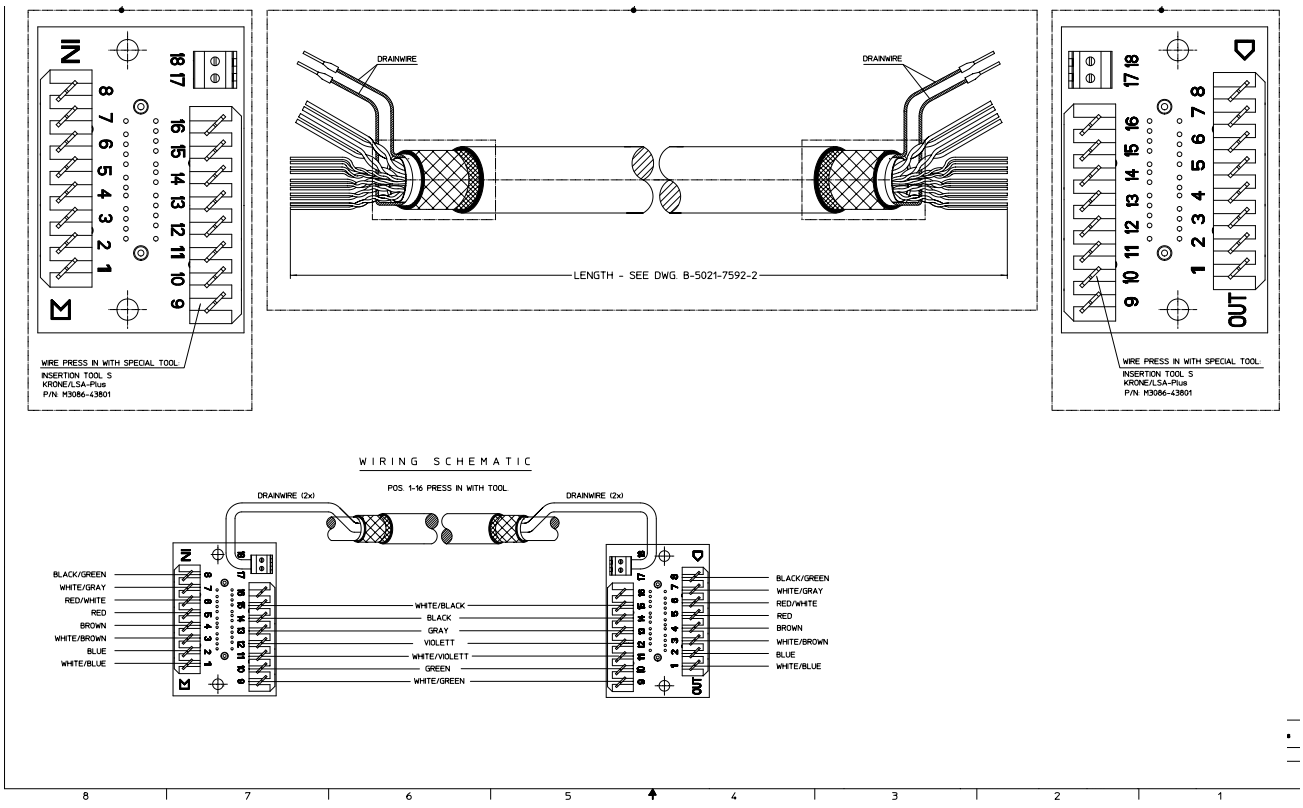


Figure 28 Wiring Schematic

4 Use a small screwdriver to connect the two drain wires to the PCB, see the wiring schematic in Figure 28.

5 Slide the PCB back on to the metallic mounting flange.

6 Use screws to fasten the mounting flange to the wall.

NOTE US version only: Fasten the rectangular wall-mounting plate to the wall. Attach the mounting flange to the wall-mounting plate.

7 Mount the plastic cover. The plastic cover consists of two pieces:

– Frame

– Angled cover

Put the frame over the mounting insert and the PCB. Place the angled cover on top and fasten with two screws.

8 Connect the monitor and the measurement server to the wall installation.

9 Perform the following tests as described in the Test and Maintenance section of this manual:

– Power-on test blocks

– Safety test blocks

– ECG Sync Performance Test

PS/2 Keyboard/Mouse

Switch off the monitor before connecting any PS/2 compatible device.

Connect the PS/2 connector either to the remote extension device or the PS/2 Interface board in the monitor at the slot indicated by the appropriate symbol.

The default keyboard language setting for all initial configurations is “US”. However, the monitor will not automatically select the best matching language for the keyboard depending on the language of its software. This means that there is no such choice as “Automatic” for the keyboard language.

To configure the keyboard language manually, go to Service Mode, select **`Main Setup`** -> **`Hardware`** -> **`Keyboard`** and then select the proper language. Please note that this setting does not clone.

Philips Clinical Network (Wired)

Refer to the installation instructions in the M3185A Installation Manual.

Philips Clinical Network (Wireless)

Refer to the installation instructions in the M3185A Philips Clinical Network Installation Manual for network installation instructions when using the wireless ethernet adapter. For instructions on connecting the wireless ethernet adapter, please refer to the instruction sheet shipped with the mounting device for the adapter.

NOTE The wireless ethernet adapter is not waterproof and therefore should not be installed anywhere where liquid could spill onto it.

Refer to the IntelliVue 802.11 a/g Infrastructure Installation and Configuration Guide for network installation instructions when using the IntelliVue 802.11 Bedside Adapter. For instructions on connecting the IntelliVue 802.11 Bedside Adapter, please refer to the Hardware Upgrade Guide for your bedside monitor.

Nurse Call Relay

Connections

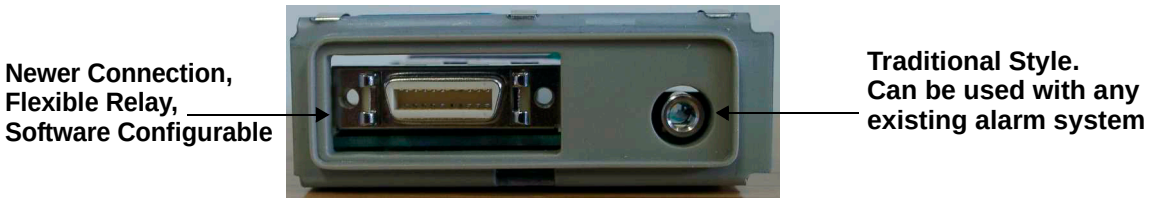


Figure 29 Flexible Nurse Call Relay Connections at Monitor

Nurse Call Relay	Connectors	Contact	Isolation
Basic Nurse Call Relay	3.5 mm phone jack active closed contact only	≤ 100 mA, ≤ 24 VDC	1.5 kV
Flexible Nurse Call Relay	20 pin MDR (Mini D-Ribbon), active open and closed contacts, 3.5 mm phone jack, active closed contact only	≤ 100 mA, ≤ 24 VDC	1.5 kV

See “Multi-Port Nurse Call Connector Test (Flexible Nurse Call)” on page 54 for details on the Nurse Call Relay Connector pin assignment.

ECG Out Functionality

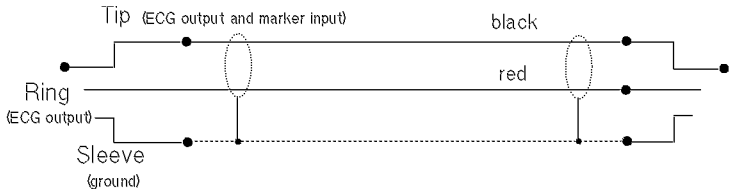
Connections

The cable M1181A #A62 has both ends terminated. The photograph above shows the monitor side connection.

If using a non-terminated cable:

1 Strip 5 mm (3/16") insulation from leads and twist conductor strands tightly.

2 Solder leads to the connector as shown in the following diagram.



WARNING According to AAMI specifications the peak of the synchronized defibrillator discharge should be delivered within 60 ms of the peak of the R wave. The signal at the ECG output on the IntelliVue patient monitors is delayed by a maximum of 30 ms. Your biomedical engineer should verify that your ECG/Defibrillator combination does not exceed the recommended maximum delay of 60 ms.

Configuration Tasks

You must configure these settings during installation in configuration mode.

- Line Frequency
- Printer
- Altitude
- Equipment Label (for wireless networked monitors, or when the Information center is in flexible monitoring mode).

Setting Altitude and Line Frequency

You require a local barometric pressure rating from a reliable source (such as airport, regional weather station, or hospital weather station) that is located at the same altitude as the institution.

1 From the **Main Setup** menu, select **Global Setting**. Select **Altitude** and enter the altitude.

2 From the **Main Setup** menu, select **Global Setting**. Select **Line Frequency** and choose the Line Frequency.

Configuring the Equipment Label

If the Information Center is in fixed monitoring mode, it controls the equipment label. You do not need to follow this procedure.

However, if you are on a wireless network, or your Information Center is configured for flexible monitoring mode, you must set the equipment label. This associates the monitor with a central monitoring sector. An identical monitor label must also be configured in the Information Center.

1 Select the **Bed Label** screen element to call up the **Bed Info** menu.

2 Select **Equipment Label** to call up the onscreen keyboard.

3 Enter the system identifier. This needs to be set up in either the monitor or the information Center. If the Information Center is in flexible monitoring mode, the monitor must be setup to match the Information Center's monitor label.

Configuring the printer

1 From the **Main Setup** menu select **Reports**.

2 Select **Printer Settings** and configure **Local** to enabled if the printer is connected directly to the monitor. See configuration guide for further details.

8

Site Preparation

Introduction

This section describes the procedures you should follow to plan and prepare a site for an MP40/MP50 monitor installation. It describes:

- Site planning.
- Roles and responsibilities for local and Philips personnel.
- Remote installation planning.

Site Planning

The careful planning of the site for the MP40/MP50 monitor is essential for its safe and efficient operation. A consulting schedule should be established between the Customer and Philips Sales and Support Representatives, to ensure that all preparations are completed when the system is delivered.

The site planning phases prior to equipment installation are:

Location: Planning the location of the various system components.

Environment: Confirming and correcting, as necessary, the environment of the proposed installation site(s).

System Capabilities: Explaining the possibilities for system expansion.

Mounting: Referencing the mounting hardware information website for the listing of suitable mounting hardware recommended for use with the various system components, and all details on the available mounts and accessories.

Cabling: Identifying the requirements for the cabling, conduiting and faceplates for connecting the various system components.

Roles & Responsibilities

This section describes the procedures necessary to prepare a site for a system installation. The procedures are grouped into two parts: procedures that local staff or contractors are responsible for, and procedures that Philips personnel are responsible for.

Site Preparation Responsibilities

Local Staff

- Ensure that all safety, environmental and power requirements are met.
- Provide power outlets.

- Prepare mounts.
- Pull cables, install conduit, install wallboxes.
- Terminate network cables if a Philips Clinical Network is in use.
- It may be necessary to certify the network cable plant, see Philips Clinical Network Installation Manual for details.

Philips Personnel

- Provide the customer with the safety, environmental and power requirements.
- Assemble mounts.
- Prepare monitor remote cabling.

Procedures for Local Staff

The following tasks must be completed **before** the procedures for Philips personnel may be started.

- Providing Power Outlets

 One power outlet for each display and for any peripheral device (for example, a printer or slave display) is required by the system. Provide a power outlet in the vicinity (1 m or 3 ft) of each component that requires power.

WARNING Only the power cables provided with the system may be used. For reasons of safety, power (mains) extension cables or adapters shall not be used.

- Preparing Mounts

 Where ceiling, wall, or shelf mounts are required for mounting the equipment, the customer is responsible for the following:

 – Providing and installing all hardware which is required to install the mounting hardware supplied by Philips as detailed in the installation notes.
 – Making sure that all ceilings, walls, and mounting rails that supports mounting hardware are suitable for their proposed load.

WARNING It is the customer's responsibility to have the attachment of the mounting hardware to the ceiling, wall, or mounting rail and the construction of the ceiling, wall, or mounting rail evaluated for structural integrity and compliance with all local, state and any other required codes by a registered, professional, structural and/or mechanical engineer.

Although considerable effort has been made to ensure the safety of the ceiling mount installation and or mounting guidelines, it is to be understood that the installation itself is beyond the control of Philips Medical Systems. Accordingly, Philips Medical Systems will not be responsible for the failure of any such installation.

- Providing Conduit

 Where a remote installation is required, for example the installation of a remote display, the customer is responsible for the following hardware installations:

- Providing conduit and/or trunking of a sufficient cross-sectional area for the planned cables and possible future expansion (for additional components or systems). See *Cabling Options and Conduit Size Requirements* for cable specifications for remote installations.
- Providing and/or installing suitable wall boxes to accommodate the faceplates.

- Pulling Cables

WARNING NEVER run power cables through the same conduit or trunking used for system cables.

- Installing Wall Boxes

It is the customer's responsibility to provide and install wallboxes to house faceplates. The customer must notify the Philips installation coordinator of which size is to be used.

Procedures for Philips Personnel

Before you begin the procedures in the installation sections, ensure that the customer has completed all necessary preparations outlined in the previous section, "Procedures for Local Staff."

Monitor M8003A and M8004A Site Requirements

Space Requirements

The situating of the monitor should be planned such that the nursing staff are able to monitor the patient with relative ease, with all patient connectors and controls readily available and the displays clearly visible. The location should also allow access to service personnel without excessive disruption and should have sufficient clearance all round to allow air circulation.

Maximum dimensions and weight:

Size (W x H x D)

365 x 330 x 217 mm

Weight

6.7 kg (14.8 lb)

Environmental Requirements

The environment where the MP40/MP50 monitor will be used should be reasonably free from vibration, dust and corrosive or explosive gases. The ambient operating and storage conditions for the MP40/MP50 monitor must be observed. If these conditions are not met, the accuracy of the system will be affected and damage can occur.

Temperature

Operating: 0 to 35°C (32 to 95°F)

Storage: -20 to 60°C (-4 to 140°F)

Humidity

Operating: 20% to 85% Relative Humidity (RH) (non-condensing)

Storage: 5% to 85% Relative Humidity (RH)

Altitude

Operating: 0m to 3000m (10000 ft.)

Storage: 0m to 12000m (40000 ft.)

Battery Storage

-20 to 50°C (-4 to 122°F)

Electrical and Safety Requirements (Customer or Philips)

Safety Requirements

If the M40/MP50 monitor is to be used in internal examinations on the heart or brain ensure that the monitor is connected to an equipotential grounding system.

Grounding

The MP40/MP50 monitor **MUST** be grounded during operation (Class I equipment according to IEC 60601-1). If a three-wire receptacle is not available then the hospital electrician must be consulted to ensure that proper grounding is available on installation. **NEVER** attempt to use a three-wire to two-wire adapter with the MP40/MP50 monitor.

WARNING Each component must be individually grounded for safety and interference suppression purposes.

Electrical Requirements

Line Voltage Connection

The MP40/MP50 monitor uses < 100 W (1.8 to 1.0 A).

Line Voltage

The MP40/MP50 monitor may be operated on ac line voltage ranges of 100 to 240V (50/60 Hz).

Remote Device Site Requirements

The system can be installed with one or more combinations of the following remote devices.

Multi-Measurement Server

Remote Display

Remote Alarm Device

Remote Extension Device (with or without SpeedPoint)

Where more than one site is used for locating equipment (a remote installation), the following sections should be considered for EACH device:

- Space Requirements

- Environmental Requirements
- Mounting
- Electrical and Safety Requirements
- Cabling Options and Conduit Size Requirements

Connecting Non-Medical Devices

The standard IEC-60601-1-1 applies to any combination of medical and non-medical devices, where at least one is a medical device. Therefore IEC-60601-1-1 must still be met after all devices are connected.

WARNING Do not use a device in the patient vicinity if it does not comply with IEC-60601-1. The whole installation, including devices outside of the patient vicinity, must comply with IEC-60601-1-1; one reasonable solution may be the use of an isolation transformer. If the monitor is used with battery operation, always use an isolation transformer when connnecting an additional display.

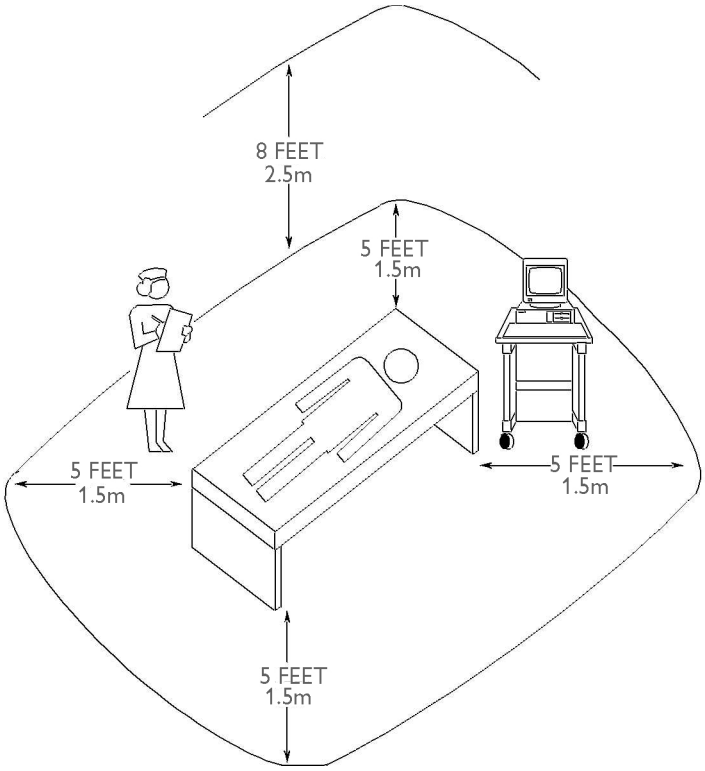


Figure 30 Equipment Location in the Patient Vicinity

NOTE The site planning requirements, with the exception of the cabling, must be provided by the device manufacturer, if the remote device is not purchased from Philips.

Multi-Measurement Server M3001A

Space Requirements Multi-Measurement Server M3001A

Size (W x D x H)

188.0mm x 96.5 mm x 51.5 mm

(7.40” x 3.80” x 2.03”)

Weight

650g (1.4 lb)

Environmental Requirements Multi-Measurement Server M3001A

Temperature

Operating: 0 to 45°C (32 to 113°F)

Storage: -40 to 70°C (-40 to 158°F)

Humidity

Operating: 95% relative humidity (RH) max. @ 40°C (104°F)

Storage: 90% relative humidity (RH) max. @ 65°C (150°F)

Altitude

Operating: -500m to 4600m (-1600 to 15000 ft.)

Storage: -500m to 15300m (-1600 to 50000 ft.)

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the FMS and the MMS.

Table 7 M8048A and M3001A Cables

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
Both ends are terminated with straight MSL connectors.					
M8022A #SC1	M3081-61626 453563474781	0.75m Measurement Server to Monitor	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC2	M3081-61602 453563377851	2m Measurement Server to Monitor	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC4	M3081-61603 453563402731	4m Measurement Server to Monitor	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC6	M3081-61627 453563484501	10m Measurement Server to Monitor[a]	72 mm^2	40 mm	40 mm x 17 mm
M8022A #SC7	M3081-61628 453563484511	15m Measurement Server to Monitor[a]	72 mm^2	40 mm	40 mm x 17 mm

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #SC9	M3081-61629 453563484521	25m Measurement Server to Monitor[a]	72 mm^2	40 mm	40 mm x 17 mm
Unterminated Cables					
M3081A #A15	M3081-61615 453563484481	MSL Installation Cable 15m	72 mm^2	40 mm	40 mm x 17 mm
M3081A #A25	M3081-61625 453563484491	MSL Installation Cable 25m	72 mm^2	40 mm	40 mm x 17 mm
Faceplates					
M3081A #C06	M3081-68708 453563484541	MSL Face Plate US version (pair of connector boxes)	n/a	n/a	n/a
M3081A #C07	M3081-68707 453563484531	MSL Face Plate non-US version (pair of connector boxes)	n/a	n/a	n/a
[a]Built on demand..					

Mounting

Table 8 M3001 Multi-Measurement Server Mounts

Product Option Number	Part Number 12NC Part No.	Description
M3080A #A01 M8007A #E20	n/a M4046-62501 453563469731	Wall Mounting Plate Mount for back of MP60/70

Remote Displays (M8031A)

Space Requirements

Size (W x D x H)

With mounting bracket: 333mm x 408mm x 85mm (13.1” x 16” x 3.4”)

With desk stand: 387mm x 408mm x 175mm (15.2” x 16” x 6.9”)

Weight

With mounting bracket: 4900g (10.8lb)

With desk stand: 6900g (15.2lb)

Environmental Requirements

Temperature

Operating: 5 to 45°C (41 to 113°F

Storage: -20 to 60°C (-4 to 140°F)

Humidity

Operating: 95% RH max @ 40°C (104°F)

Storage: 85% RH max @ 50°C (122°F)

Altitude

Operating: Up to 4600m (15000 ft.)

Storage: Up to 4600m (15000 ft.)

Electrical and Safety Requirements

Voltage ranges:

90V to 264V

Voltage selection:

Wide range input, no voltage selection required

Max. Power consumption: 40W

Remote Displays (M8031B)

Space Requirements

Size (W x D x H)

372mm x 308mm x 74.1mm (14.65” x 12.13” x 2.92”)

Weight

Without deskstand: 5200g (11.5lb)

With desk stand: 9000g (19.8lb)

Environmental Requirements

Temperature

Operating: 0 to 40°C (32 to 104°F)

Storage: -20 to 60°C (-4 to 140°F)

Humidity

Operating: 20 to 85% RH (Non-condensing)

Storage: 5 to 85% RH (Non-condensing)

Altitude

Operating: Up to 4000m (13123.36 ft.)

Storage: Up to 12000m (39370,08 ft.)

Electrical and Safety Requirements

Voltage ranges:

90V to 264V

Voltage selection:

Wide range input, no voltage selection required

Power consumption: ~30W

Remote Displays - M8033A

Space Requirements

Size (W x Hx D)

Landscape mode: 457mm x 457mm x 216mm (18” x 18” x 8.5”)

Portrait mode: 457mm x 495mm x 216mm (18” x 19.5” x 8.5”)

Weight: 8.9 kg (20 lbs)

Environmental Requirements

Temperature

Operating: 0 to 40°C (32 to 104°F)

Storage: -20 to 60°C (-4 to 140°F)

Humidity

Operating: 10 to 90% RH (Non-condensing)

Storage: 10 to 90% RH (Non-condensing)

Altitude

Operating: Up to 2400m (8000 ft.)

Storage: Up to 12200m (40000 ft.)

Electrical and Safety Requirements

Voltage ranges:

90V to 264V (13.5A fuse)

Voltage selection:

Wide range input, no voltage selection required

Power consumption: 60 watts maximum

Remote Displays - M8033B

Space Requirements

Size (W x Hx D)

404mm x 401mm x 234mm (15.9” x 15.8” x 9.2”)

Weight

Without deskstand: 4.8 kg (10.6 lbs)

With deskstand: 8.8 kg (20 lbs)

Environmental Requirements

Temperature

Operating: 0 to 40°C (32 to 104°F)

Storage: -20 to 65°C (-4 to 140°F)

Humidity

Operating: 10 to 90% RH (Non-condensing)

Storage: 10 to 90% RH (Non-condensing)

Altitude

Operating: Up to 2438m (8000 ft.)

Storage: Up to 12192m (40000 ft.)

Electrical and Safety Requirements

Voltage ranges:

100V to 240V

Voltage selection:

Wide range input, no voltage selection required

Power consumption: 50 watts maximum

Remote Displays - M8033C

Space Requirements

Size (W x Hx D)

410mm x 362mm x 103mm (16.1” x 14.25” x 4.1”)

Weight

Without deskstand: 7 kg (15.4 lbs)

With deskstand: 10.8 kg (20 lbs)

Environmental Requirements

Temperature

Operating: 0 to 40°C (32 to 104°F)

Storage: -20 to 60°C (-4 to 140°F)

Humidity

Operating: 20 to 85% RH (Non-condensing)

Storage: 5 to 85% RH (Non-condensing)

Altitude

Operating: Up to 4000m (8000 ft.)

Storage: Up to 12000m (40000 ft.)

Electrical and Safety Requirements

Voltage ranges:

90V to 264V

Voltage selection:

Wide range input, no voltage selection required

Power consumption: 60 watts maximum

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the M8031A/B 15” and the M8033A/B/C 17” TFT Medical Grade Touch Displays.

Table 9 Analogue Video Cables

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022 #VA2	M3080-61606 453563484451	1.5m Analogue Video Cable Kit	64 mm^2	40 mm	35 x 16 mm
M8022 #VA3	M3080-61602 453563334661	3m Analogue Video Cable Kit	64 mm^2	40 mm	35 x 16 mm
M8022 #VA6	M3080-61603 453563334671	10m Analogue Video Cable Kit[a]	64 mm^2	40 mm	35 x 16 mm
M8022 #VA7	M3080-61607 453563484461	15m Analogue Video Cable Kit[a]	64 mm^2	40 mm	35 x 16 mm
M8022 #VA9	M3080-61608 453563484471	25m Analogue Video Cable Kit[a]	64 mm^2	40 mm	35 x 16 mm
M1181A #A78	M1181-61695 453563255281	3m XGA Video Cable with right-angled connector. Computer module to M1097A display.			
M1181A #A79	M1181-61698 453563255291	10m XGA Video Cable with right-angled connector. Computer module to M1097A.			
Both ends are terminated with HDSUB15 (“VGA”) straight connectors [a]Built on demand					

Touch Cable

Product Option Number	Part Number	12NC Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #TC2	M8081-61010	451261006551	Touch Cable, 1.5m	30mm^2	25mm	35 x 16 mm
M8022A #TC3	M8081-61011	451261006561	Touch Cable, 3m	30mm^2	25mm	35 x 16 mm
M8022A #TC6	M8081-61012	451261006571	Touch Cable, 10m	30mm^2	25mm	35 x 16 mm
M8022A #TC7	M8081-61013	451261006581	Touch Cable, 15m	30mm^2	25mm	35 x 16 mm
M8022A # TC9	M8081-61014	451261006591	Touch Cable, 25m	30mm^2	25mm	35 x 16 mm

Remote Alarm Devices

Space Requirements

Size (W x D x H)

62mm x 125mm x 63 mm (2.4” x 5” x 2.5”)

Weight

< 300 g (< 0.7 lb)

Mounting

Table 10 Remote Alarm Device Mounting

The mounts for the Remote Alarm Device ship with the Universal Mounting Clamp (5061-8363)

Product Option Number	Part Number	Description
n/a	M8026-64001	Wall Mount

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the Remote Alarm Device M8025A.

Table 11 M8025A Remote Alarm Device Cables

Product Option Number	Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #HF2	M8086-61003	1.5m Monitor to Remote Device	30 mm^2	30 mm	27 x 13 mm
M8022A #HF3	M8086-61004	3m Monitor to Remote Device	30 mm^2	30 mm	27 x 13 mm
M8022A #HF6	M8086-61005	10m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
M8022A #HF7	M8086-61006	15m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
M8022A #HF9	M8086-61007	25m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
Both ends are terminated with straight MDR connectors. [a]Built on demand.					

Remote Extension Device

Space Requirements

Size (W x D x H):

103mm x 139mm x 63 mm (4” x 5.5” x 2.5”)

Weight:

< 400 g (< 0.9 lb)

Mounting

Table 12 Remote Extension Device Mounting

The mounts for the Remote Extension Device ship with the Universal Mounting Clamp (5061-8363)

Product Option Number	Part Number	Description
n/a	M8026-64001	Wall Mount
n/a	M8026-64002	Mount to FMS

Cabling Options and Conduit Size Requirements

The following table describes the cabling options for the M8026A Remote Extension Device.

Table 13 M8026A Remote Input Extension Device Cables

Product Option Number	Part Number	Description	Conduit Sizes	Bend Radius	Connector Size (L x W)
M8022A #HF2	M8086-61003	1.5m Monitor to Remote Device	30 mm^2	30 mm	27 x 13 mm
M8022A #HF3	M8086-61004	3m Monitor to Remote Device	30 mm^2	30 mm	27 x 13 mm
M8022A #HF6	M8086-61005	10m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
M8022A #HF7	M8086-61006	15m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
M8022A #HF9	M8086-61007	25m Monitor to Remote Device[a]	30 mm^2	30 mm	27 x 13 mm
Both ends are terminated with straight MDR connectors. [a]Built on demand.					

Input Devices

The following tables describes the input devices which can be connected to the Remote Extension Device M8024A, or directly to the monitor.

Table 14 M8024A Input Devices

Product Option Number	Part Number	12NC Part Number	Description
M8024A #C01	M4046-60103	451261000651	Wired Track Ball USB/PS2
M8024A #B01	M4046-60104	451261000661	Optical Mouse USB PS/2
M8024A #C02	M4046-60105	451261000671	Wireless Track Ball
M8024A #C03	M4046-60106	451261000681	Wired off table Track Mouse

Local Printer

See printer documentation

Philips Medical LAN

For information refer to the IntelliVue Information Center documentation.

Table 15 Wireless LAN Adapter Cable

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius
M8022A #WL0	M8080-61001 453563484581	~30cm Y-piece; DC supply plus LAN for Wireless Ethernet Adapter	30 mm^2	30 ,mm
n/a	M2639-61001 451261013011	Cable Assembly Mini Din 8 Pin 1:1r for IntelliVue 802.11 Bedside Adapter		

RS232/MIB/LAN Interface

Table 16 MIB Cable and Serial Cable

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Max. Bend Angle	Connector Size (L x W)
M8022A #SR2	M8081-61001 453563484591	1.5m cable incl. adapter set.	30 mm^2	25 mm	15 x 15 mm
M8022A #SR3	M8081-61002 453563484601	3m cable incl. adapter set.	30 mm^2	25 mm	15 x 15 mm
M8022A #SR6	M8081-61003 453563484611	10m cable incl. adapter set[a].	30 mm^2	25 mm	15 x 15 mm
M8022A #SR7	M8081-61004 453563484621	15m cable incl. adapter set[a]	30 mm^2	25 mm	15 x 15 mm
M8022A #SR9	M8081-61005 453563484631	25m cable incl. adapter set[a]	30 mm^2	25 mm	15 x 15 mm
Both ends are terminated with 8 pin RJ45 connectors. CAT5 cable; straight through wiring. [a]Built on demand. Adapter Set includes DSUB 9 to RJ45 adapter for touch operation and yellow LAN indicator ring.					

Figure 31 Cable and Adapter Set



Nurse Call Relay Interface

Table 17 Nurse Paging Cable

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size
M8022A #NC3	M1181-61648 453563375601	3m traditional nurse paging relay cable. One end terminated with phone plug, one end without connector.	13 mm^2	20 mm	Diameter 12 mm
M8022A #NC6	M8087-61001 453563484741	10m flexible nurse paging cable. One end terminated with straight MDR connector, one end without connector.	40 mm^2	30 mm	35 x 16 mm

ECG Out Interface

Table 18 ECG Out Cable

Product Option Number	Part Number 12NC Part No.	Description	Conduit Sizes	Bend Radius	Connector Size (Diameter)
M8022A #A62	8120-1022 453563198151	3m cable (Both ends are terminated with .25” phone plugs)	40 mm^2	30 mm	13 mm
	M1181-61625 453563255091	cable kit consisting of: 25 m raw cable, 2 x 1/4” socket, 1 x 1/4” plug			

9

Gas Analyzers

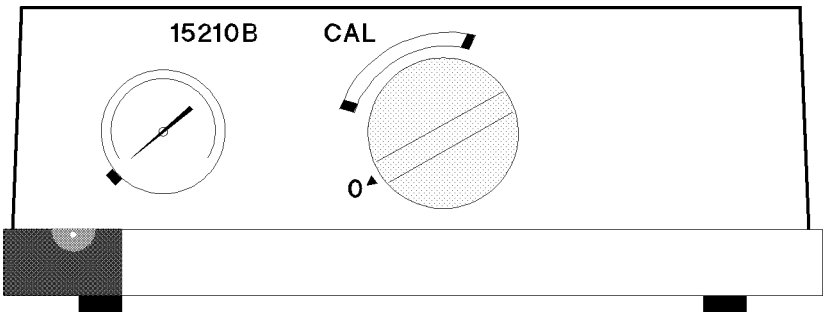
For details on the M1026A/B Anesthetic Gas Module and the M1013A Essential Gas Module, please refer to the respective Service Guides on your documentation CD.

Appendix A

Philips 15210B Calibration Unit

The Philips 15210B Calibration Unit consists of a gas cylinder connected to a gas outlet via a time controlled valve. The valve is normally closed, ensuring that no gas is lost when the unit is not in use. When the unit is set up for use and the timer control knob is turned, gas is directed to the calibration chamber on the tcpO_2/tcpCO_2 module (Philips M1018A) for a period of up to 20 minutes. After this time the valve automatically closes.

This section provides the necessary information for you to install and service the Philips 15210B.



Calmod.tif

Unpacking the Instrument

If external damage to the shipping carton is evident, ask the carrier's agent to be present when the unit is unpacked.

Initial Inspection

Check the instrument for any external damage such as dents and scratches on panel surfaces. If the shipping carton is not damaged, check the cushioning material and note any signs of severe stress as an indication of rough handling in transit. Retain the packaging material for possible repacking.

Claims for Damage

If physical damage is evident when the Calibration Unit is received or the unit does not meet the specified operational requirements, please notify the carrier and the nearest Philips Sales/Service office immediately. The Sales/Service office will arrange for repair or replacement without waiting for settlement of the claim against the carrier.

Repacking for Shipment or Storage

If the Calibration Unit is to be shipped to a Philips Sales/Service office, securely attach a tag showing the name and address of the owner, the model and serial number, and the repair required or symptoms of the fault. If available and reusable, the original shipping carton and packaging material should be used to provide adequate protection during shipping. The Philips Sales/Service office will provide information and recommendations on materials to be used if the original material is not available or reusable.

Instrument Identification

Philips uses a nine character sequence for instrument identification. The serial number is located on a plate attached to the rear panel of the instrument.

Specification

Gas Supply:	1 low pressure cylinder.
Gas Flow:	8 ml +4/-2 ml per minute for 15210-64010, 12 ml +4/-2 ml per minute for 15210-60010.
Cylinder Pressure:	Indicated by an integral pressure manometer.
Timer Period:	20 minutes.
Dimensions:	90mm (35.4in) high x 220mm (86.6in) wide x 235mm (92.5in) deep, (without cylinder).
Weight:	2.4 kg (5.3lbs), (without cylinder).

NOTE The 15210B is intended for use with Philips “CAL 1” gas cylinders (part number 15210-60010 **or** 15210-64010 for Europe and Japan).

Operating Environment

The environment where the Philips 15210B will be used should be reasonably free from vibration, dust, corrosive or explosive gases, extremes of temperature, humidity, etc. The Philips 15210B operates within specifications at ambient temperatures between 0°C and 55°C. The maximum operating relative humidity is 95% at 40°C. Ambient temperatures or humidities which exceed these limits could affect the accuracy of the calibration unit and cause damage to components.

Operating Information

Each Philips 15210B is delivered with a multilanguage collection of stick-on operating labels. Each label summarizes day-to-day operating procedures using the Calibration Unit. It is intended to be stuck to the top surface of the Unit; however, it may be attached to any flat, grease-free surface.

To attach label: Clean the surface where the label is to be placed with soapy water to remove any dirt or grease. Dry the surface thoroughly. Peel off the paper backing and carefully place the label in the required position. Press down firmly with a clean dry cloth, paying particular attention to the edges.

Fitting the Gas Cylinders

When the Calibration Unit is delivered, no gas cylinder is fitted. Before putting the unit into service, screw the cylinder into the opening in the rear panel (See “Routine Maintenance” on page -241, next section).

When new, the calibration unit will contain a small amount of normal air. To expel this air before use and thus prevent inaccurate calibration, turn the timer control fully clockwise after fitting the gas cylinders and allow it to run for the full period. The calibration unit is now ready for use.

Storage of Gas Cylinders

New gas cylinders should be stored in a cool place and not exposed to direct sunlight.

Disposal of Used Gas Cylinders

Do not crush or incinerate used gas cylinders. They may be disposed of as scrap metal.

Routine Maintenance

Changing the Gas Cylinders

Before each calibration the gas pressure indicator on the Philips 15210B front panel should be read. If the indicator is in the “black” zone, change the gas cylinder as follows:

1 From the rear of the unit turn the empty gas cylinder anti-clockwise until the cylinder is free (3-6 turns).

2 Withdraw the empty cylinder.

3 Take a full gas cylinder and insert it squarely into the rear of the unit. Turn clockwise until hand tight.

4 Check that the pressure indicator is no longer in the “black” zone.

Care and Cleaning

Keep the surfaces of the calibration unit clean and free of dust and dirt. Clean regularly with a lint-free cloth or sponge dampened in soapy water. Avoid using alcohol or ammonia based cleaners which may damage the Calibration Unit. Other strong cleaners such as Povidine RR, Lysol R and Mikroklene R are not recommended since they may stain the unit. Do not pour any liquid on the instrument while cleaning. Never use an abrasive material such a steel wool or metal polish. Cleaning agents and disinfectants should only be used in cases of stubborn dirt. If used, carefully remove any remaining traces of cleaning agent or disinfectant with clean water.

NOTE Do not allow water to enter the gas outlet.

To clean the gas outlet: Use cotton wool soaked in soapy water to remove any deposits which may collect in the outlet. Dry the outlet thoroughly after cleaning. In the case of severe blockages, a thin length of wire may be used to free the outlet pipe.

Theory of Operation

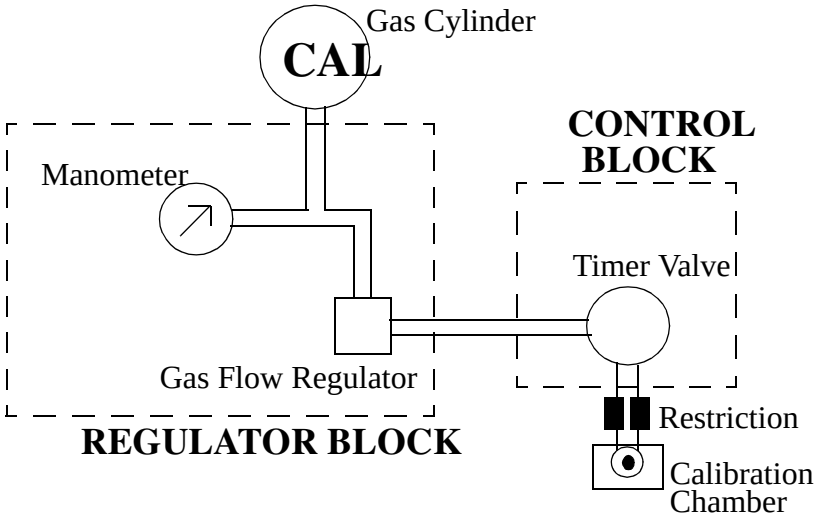


Figure 32 Block diagram - Internal Components

The gas cylinder is screwed directly into a pressure *regulator block*. This block ensures that, in combination with the *restriction*, the gas flow remains constant as the pressure in the cylinders falls with use. From the regulation block the gas is channelled to the *control block.* The gas passes into the control block via an opening in the side sealed with an "O" ring and filter. The control block acts as a switch.

A restriction piece is fitted in the tubing connecting the control block to the gas outlet. The restriction helps to regulate the gas flow.

Gas Flow Performance Check

Philips recommends that the following gas flow check is conducted once a year.

Test Procedure

1 Check that the pressure indicator is not in the black zone (i.e. that there is an adequate supply of gas in the cylinder).

2 Fit gas tubing to the gas outlet, then take the free end and fit it to a water-filled syringe in a glass of water.

3 Turn the timer control fully clockwise and note the volume of water displaced after 60 seconds.

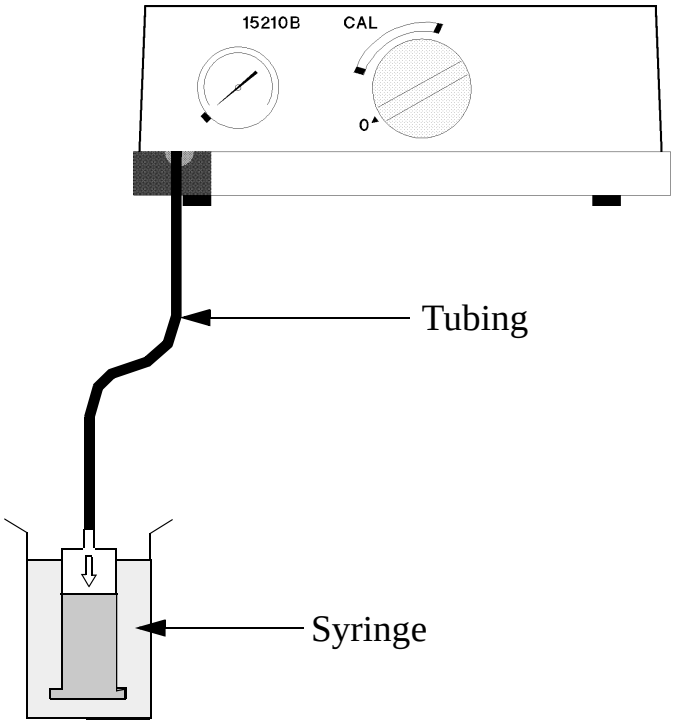


Figure 33 Test Procedure

Action if outside specification

The volume of water displaced in 60 seconds should be 8ml (4/-2ml) for the 15210-64010 gas cylinder or 12ml (+4/-2ml) for the 15210-60010 gas cylinder. If the displacement is within the appropriate one of these ranges, the supply of gas in within specification.

If the gas flow is less that the permitted minimum, remove the Calibration Unit cover (see *Cover Removal* in the next section) and look for an occlusion or leakage.

If the gas flow is greater than the permitted maximum, follow the procedure below:

1 Replace the gas cylinder with a new cylinder.

2 Turn the *Gas flow adjuster screw* on the underside of the unit to reduce the gas flow (see next figure to locate the gas flow adjuster).

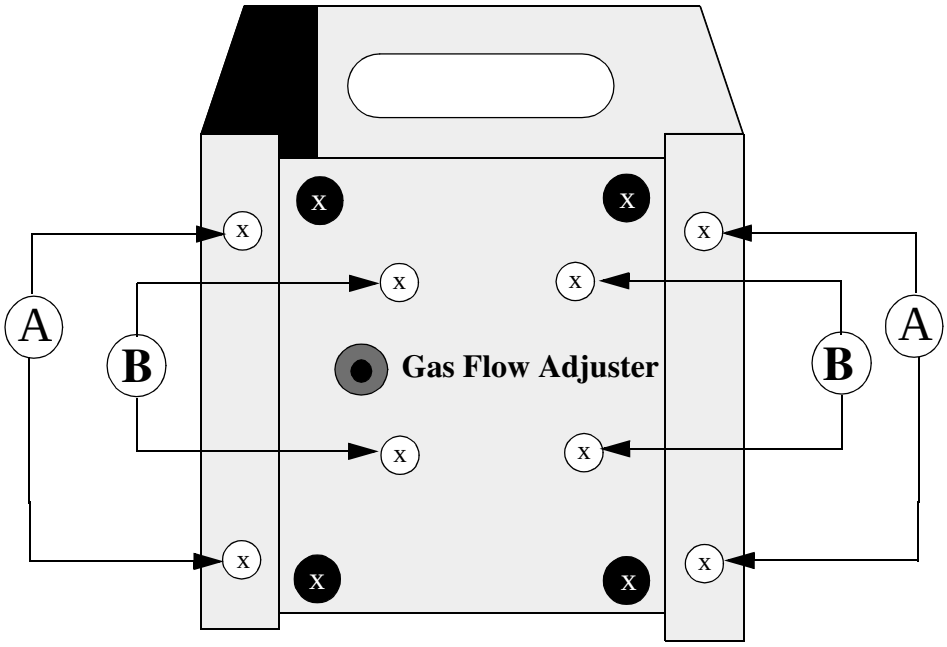


Figure 34 Calibration Unit viewed from underneath

3 Repeat the gas flow performance check described above. If the gas flow is still significantly greater than the permitted maximum, remove the cover following the procedure *(Cover Removal)* below.

4 Remove the flow restriction by pulling the tubing off (see Figure 3-4), select a new restriction from the set of restriction pieces (part number 15210-68703) and fit in the unit.

5 Reassemble the unit and repeat the gas flow performance check.

6 Turn the gas flow adjuster screw as necessary.

7 If the gas flow is still greater that the specified rate, repeat the above steps, inserting a longer restriction.

Disassembly

Tools Required: Pozidrive screwdriver, size GN1, Normal screwdriver, size 1/7, Hex-key (Allen-key), size SW 3mm.

1 Cover Removal

a. Remove the gas cylinder from the calibration unit.

b. Remove the four screws on the base of the unit (labeled A – see figure).

c. Slide the cover off towards the rear of the unit.

2 Timer Control Knob

a. The timer control know is secured with a “grub-screw” located in the side of the knob. Loosen this screw approximately 2 turns. The knob can now be pulled off.

b. Regulator / Control Block Removal

c. Complete operations 1 and 2 above.

d. Remove the connection pipe from the rear of the Calibration Chamber.

e. Unscrew the four remaining screws on the unit base (labeled B in the figure) to release the Regulator / Control Block.

f. The two screws on the regulator block side can now be removed to separate the regulator block from the control block. Be careful not to misplace the “O” ring and filter which are fitted between the two blocks.

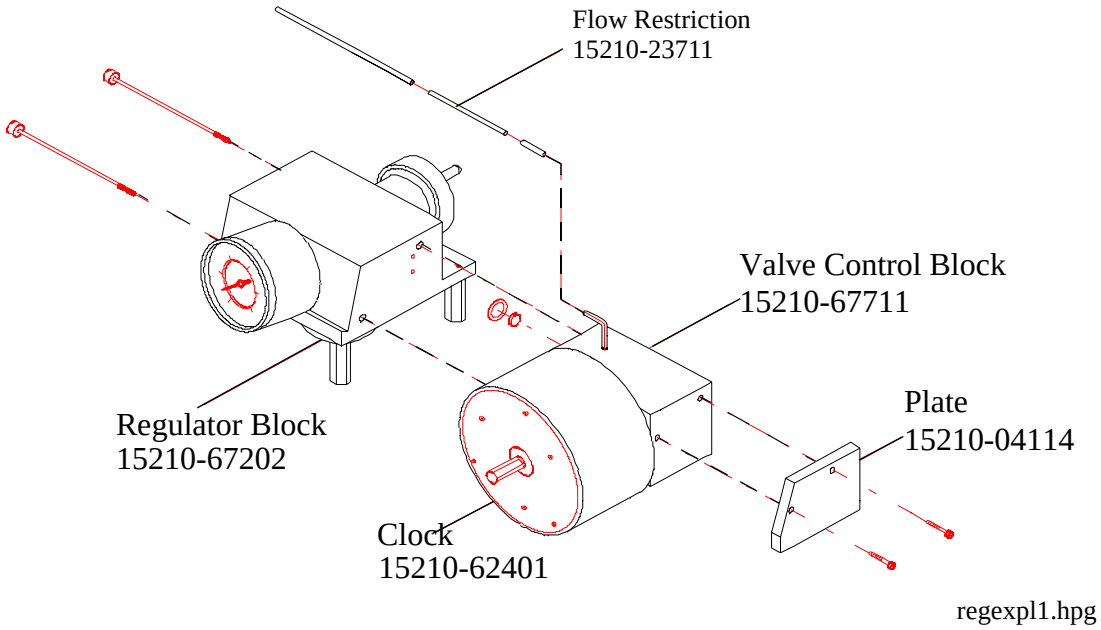


Figure 35 Exploded view - Regulator and Control Blocks

Parts List

Table 1: Replaceable Parts for the 15210B

Part Number	Description
15210-47101	Flat sealing ring (to seal gas bottle)
15210-47106	Membrane foil
15210-62401	Clock
15201-67711	Valve control block
15210-67202	Regulator block left
15210-23711	Flow regulator restriction
0905-0678	8mm ring - between valve control block and regulator block
15210-27401	Timer control knob
0515-0777	Screw M6x8 (for timer control knob)
15210-04111	Cover - bottom
15210-04102	Cover - top
15210-24702	Spacer - hexagonal nut for mounting regulator bloc
15210-62302	Gas outlet block
M2205A	Calibration tubing (set of 5)

Appendix B

IntelliVue Product Structure

The following tables show the product option structure and available upgrades for all monitors of the IntelliVue family.

IntelliVue Family - Product Structure												
		MP20 J	MP20 L	MP20	MP30	MP40	MP50	MP60	MP70	MP80	MP90	
		M8001A #M20	M8001A #M21	M8001A	M8002A	M8003A	M8004A	M8005A	M8007A	M8008A	M8010A	
Required Additional Purchases												
#	**Waves**											
A03	3 waves	standard (1)	standard (1)	optional	optional	not offered	not offered	not offered	not offered	not offered	not offered	
A04	4 waves	not offered	not offered	optional	optional	optional	optional	optional	optional	optional	not offered	
A06	6 waves	not offered	not offered	optional (2)	optional (2)	optional	optional	optional	optional	optional	optional	
A08	8 waves	not offered	not offered	not offered	not offered	optional (3)	optional (3)	optional (2)	optional	optional	optional	
A12	12 waves	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	optional	
M20	MP20 Junior	standard	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	
M21	MP20 L (18)	not offered	standard	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	
#	**Application Areas**											
H10	General / Intensive Care Software	optional	optional	optional	optional	optional	optional	optional	optional	optional	optional	
H20	Neonatal Software	optional	not offered	optional	optional	optional	optional	optional	optional	optional	optional	
H30	Anesthesia Software	not offered	not offered	optional	optional	optional	optional	optional	optional	optional	optional	
H40	Cardiac Care Software	not offered	not offered	optional	optional	optional	optional	optional	optional	optional	optional	
#	**Remote SpeedPoint Cable Kit**											
HF2	Remote SpeedPoint Cable Kit - 1.5 m	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	
HF3	Remote SpeedPoint Cable Kit - 3.0 m	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	
HF6	Remote SpeedPoint Cable Kit - 10 m	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	
HF7	Remote SpeedPoint Cable Kit - 15 m	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	
HF9	Remote SpeedPoint Cable Kit - 25 m	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	
Add-On Options												
#	**Clinical Applications**											
C01	Full Arrhythmia Capability (4)	not offered	not offered	optional	standard	optional	standard	optional	standard	standard	standard	
C02	High Resolution Trends (5)	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	optional	standard	
C03	Extended Database	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	optional	standard	
C04	Neonatal Event Surveillance (5,6)	not offered	not offered	optional(7)	optional(7)	optional	optional	optional	optional	optional	standard (8)	
C05	Drug Calculator	not offered	not offered	optional	optional	optional	optional	standard	standard	standard	standard	
C06	Basic Event Surveillance (5,6)	not offered	not offered	not offered	not offered	optional	optional	optional	optional	optional	standard (9)	
C07	Advanced Event Surveillance (5,6)	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	optional	optional	
C08	Oxy CRG	not offered	not offered	optional(7)	optional(7)	standard	standard	standard	standard	standard	standard	
C15	Networking Functionality/Software (4)	not offered	standard	optional	standard	optional	standard	optional	standard	standard	standard	
C17	Information Portal	not offered	not offered	not offered	not offered	optional	optional	optional	optional	optional	optional	
C20	Full Monitor Customization	not offered	not offered	standard	standard	standard	standard	standard	standard	standard	standard	
C30	Support of 3rd pressure and Cardiac Output	not offered	not offered	optional	optional	standard	standard	standard	standard	standard	standard	
C31	Support of 4th Pressure	not offered	not offered	not offered	not offered	optional	optional	standard	standard	standard	standard	
C90	Anesthesia OLEH support	not offered	not offered	not offered	not offered	optional	optional	optional	optional	optional	optional	
#	**Hardware Add-Ons**											
E02	Add Attached Speedpoint (10)	not offered	not offered	not offered	not offered	not offered	not offered	standard	optional	not offered	not offered	
E05	Built-in recorder	optional	optional	optional	optional	not offered	not offered	not offered	not offered	not offered	not offered	
E10	Two internal module slots	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	not offered	not offered	
E12	Four internal module slots	not offered	not offered	not offered	not offered	optional	optional	not offered	not offered	not offered	not offered	
E21	Bedhanger mount	optional	not offered	optional	optional	not offered	not offered	not offered	not offered	not offered	not offered	
E22	Quick Release Mount	optional (11)	standard	optional (11)	optional (11)	standard	standard	standard	standard	not offered	not offered	
E24	1x High Power Lithium-Ion Batteries	standard	optional	optional	optional	not offered	not offered	not offered	not offered	not offered	not offered	
E25	Battery Operation (17)	standard	optional	optional	optional	optional	optional	not offered	not offered	not offered	not offered	
E26	2x High Power Lithium-Ion Batteries	not offered	not offered	optional	optional	optional	optional	not offered	not offered	not offered	not offered	
E30	Performance Extension	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	optional	
#	**Interfaces**											
J13	MIB/RS232 serial interface (2 ports)	optional	optional	optional	optional	optional	optional	optional (12)	optional (13)	optional (14)	optional (15)	
J14	Parallel Printer Interface	not offered	not offered	optional	optional	optional	optional	optional (12)	optional (13)	optional (14)	optional	
J16	BIS interface	not offered	not offered	optional	optional	not offered	not offered	not offered	not offered	not offered	not offered	
J19	2nd MMS IF for MP90	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	optional	
J20	Wireless Interface System Board	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	optional	optional	
J21	2nd MMS IF for MP60/70	not offered	not offered	not offered	not offered	not offered	not offered	optional	optional	not offered	not offered	
J22	PS/2 Interface (2 ports)	not offered	not offered	optional	optional	optional	optional	standard	optional (13)	optional (13,16)	optional (16)	
J23	Interface for the Remote SpeedPoint	not offered	not offered	optional	optional	optional	optional	optional (12)	optional (13)	standard	standard	
J30	Flexible Nurse Call Relay	optional	not offered	optional	optional	optional	optional	optional (12)	optional (13)	optional (14)	optional	
J35	IntelliVue 802.11 bedside adapter	not offered	optional	optional	optional	optional	optional	optional	optional	optional	optional	
J40	Advanced Interface featuring wired & wireless network connectivity, SVGA Video & Nurse Call Relay	not offered	optional	optional	optional	optional	optional	not offered	not offered	not offered	not offered	
J42	Networking Hardware	not offered	optional	optional	standard	standard	standard	standard	standard	standard	standard	
J45	Instrument Telemetry (1)	not offered	optional	optional	optional	not offered	not offered	not offered	not offered	not offered	not offered	
J50	Docking Station Interface	not offered	not offered	optional	optional	optional	optional	not offered	not offered	not offered	not offered	

(1) M8001A #M20/M21
(2) not offered in the USA
(3) only for China, Hong Kong and Taiwan
(4) C15 includes C01
(5) C07 includes C02, C04, C06
(6) C04, C06 and C07 are exclusive
(7) C04 includes C08
(8) Standard with H20
(9) Standard with H10, H30, H40
(10) comes with PS/2 IF (#J22)
(11) in the US part of I.M. program
(12) For the MP60 one of J13, J14, J23, J30 is free of charge
(13) For the MP70 one of J13, J14, J22, J23, J30 is free of charge
(14) For the MP80 one of J13, J14, J22, J30 is free
(15) 4 ports are standard, two more can be ordered together with E30
(16) two ports via Remote SpeedPoint are standard
(17) batteries need to be ordered separately
(18) US only

Upgrade Options

M8027A - IntelliVue Performance Upgrades

M8027A	Options	MP20 J M8001 A #M20	MP20 L M8001 A #M21	MP20 M8001 A	MP30 M8002 A	MP40 M8003 A	MP50 M8004 A	MP60 M8005 A	MP70 M8007 A	MP80 M8008 A	MP90 M8010 A	FMS M8048 A
	Upgrading the number of waves											
A04	Upgrade from 3 to 4 waves	not offered	not offered	A04	A04	not offered	not offered	not offered	not offered	not offered	not offered	not offered
A06	Upgrade from 4 to 6 waves	not offered	not offered	A06	A06	A06	A06	A06	A06	A06	not offered	not offered
A07	Upgrade from 4 to 8 waves	not offered	not offered	not offered	not offered	A08 (1,9)	A08 (1,9)	A08 (1,2)	A08 (1)	A08 (1)	not offered	not offered
A08	Upgrade from 6 to 8 waves	not offered	not offered	not offered	not offered	A08(9)	A08(9)	A08 (2)	A08	A08	A08	not offered
A11	Upgrade from 6 to 12 waves	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	A12 (1)	not offered
A12	Upgrade from 8 to 12 waves	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	A12	not offered
	Interfaces											
J13	Serial interface/MIB ready (2 ports)	J13	not offered	J13	J13	J13	J13	J13	J13	J13	J13	not offered
J14	Parallel Printer Interface	not offered	not offered	J14	J14	J14	J14	J14	J14	J14	J14	not offered
J16	BIS interface for the MP20 and MP30	not offered	not offered	J16	J16	not offered	not offered	not offered	not offered	not offered	not offered	not offered
J18	Wireless Interface System Board for the MP80/MP90	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	J20 (3)	J20 (3)	not offered
J19	2nd measurement server interface for the MP90	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	J19	not offered
J20	Wireless Interface System Board for the MP60 and MP70	not offered	not offered	not offered	not offered	not offered	not offered	J20	J20	not offered	not offered	not offered
J21	2nd measurement server interface for the MP60 and MP70	not offered	not offered	not offered	not offered	not offered	not offered	J21	J21	not offered	not offered	not offered
J22	PS/2 Interface (2 ports)	not offered	not offered	J22	J22	J22	J22	standard	J22	J22	J22	not offered
J23	Interface for the Remote SpeedPoint and Alarm Device	not offered	not offered	J23	J23	J23	J23	J23	J23	J23	J23	not offered
J30	Flexible Nurse Call Relay	J30	not offered	J30	J30	J30	J30	J30	J30	J30	J30	not offered
J35	IntelliVue 802.11 bedside adapter	not offered	not offered	J35	J35	J35	J35	J35	J35	J35	J35	not offered
J40	Advanced System Interface for the MP40/50 featuring SVGA Video, Nurse Call Relay and wired and Wireless Nework connectivity	not offered	not offered	not offered	not offered	J40	J40	not offered	not offered	not offered	not offered	not offered
J41	Wireless Network Kit for the MP40/50	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered
J42	Networking Hardware	not offered	not offered	J42	standard	standard	standard	standard	standard	standard	standard	not offered
J45	Instrument Telemetry 1.4 GHz radio	not offered	not offered	J45	J45	not offered	not offered	not offered	not offered	not offered	not offered	not offered
J50	Docking Station Interface for the MP40/50	not offered	not offered	not offered	not offered	J50	J50	not offered	not offered	not offered	not offered	not offered
J60	Advanced System Interface for the MP20/30 featuring SVGA Video, Nurse Call Relay and wired and Wireless Nework connectivity	not offered	not offered	J40 (3)	J40 (3)	not offered	not offered	not offered	not offered	not offered	not offered	not offered
J61	Wireless Network Kit for the MP20/30	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered
J70	Docking Station Interface for the MP40/50	not offered	not offered	J50	J50	not offered	not offered	not offered	not offered	not offered	not offered	not offered
	Clinical Applications											
C01	Full Arrhythmia capability (7)	not offered	not offered	C01	standard	C01	standard	C01	standard	standard	standard	not offered
C02	High Resolution Trends (6)	not offered	not offered	not offered	not offered	not offered	not offered	C02	C02	C02	standard	not offered
C03	Extended database	not offered	not offered	not offered	not offered	not offered	not offered	C03	C03	C03	standard	not offered
C04	Neonatal Event Review (5,6)	not offered	not offered	C04	C04	C04	C04	C04	C04	C04	C04	not offered
C05	Drug Calculator	not offered	not offered	C05	C05	C05	C05	standard	standard	standard	standard	not offered
C06	Basic Event Surveillance (5,6)	not offered	not offered	not offered	not offered	C06	C06	C06	C06	C06	C06	not offered
C07	Advanced Event Surveillance (5,6)	not offered	not offered	not offered	not offered	not offered	not offered	C07	C07	C07	C07	not offered
C08	OxyCRG	not offered	not offered	C08	C08	standard	standard	standard	standard	standard	standard	not offered
C15	Networking Software (7)	not offered	not offered	C15	standard	C15	standard	C15	standard	standard	standard	not offered
C17	Information Portal	not offered	not offered	not offered	not offered	C17	C17	C17	C17	C17	C17	not offered
C20	Full Monitor Customization	not offered	not offered	C20	C20	C20	C20	C20	C20	standard	C20	not offered
C30	Support of 3rd pressure and Cardiac Output	not offered	not offered	C30	C30	standard	standard	standard	standard	standard	standard	not offered
C31	Support of 4th pressure	not offered	not offered	not offered	not offered	C31	C31	standard	standard	standard	standard	not offered
C40	Flexible Module Server Support	not offered	not offered	not offered	not offered	not offered	not offered	C40	standard	standard	standard	not offered
C90	Anesthesia OLEH support	not offered	not offered	not offered	not offered	C17 (1)	C17 (1)	C17 (1)	C17 (1)	C17 (1)	C17 (1)	not offered
	Hardware Add-Ons											
E02	Add Attached Speedpoint (8)	not offered	not offered	not offered	not offered	not offered	not offered	standard	E02	not offered	not offered	not offered
E05	Integrated Recorder	optional	not offered	optional	optional	not offered	not offered	not offered	not offered	not offered	not offered	not offered
E10	Two internal module slots	not offered	not offered	not offered	not offered	not offered	not offered	E10	E10	not offered	not offered	not offered
E12	Four internal module slots	not offered	not offered	not offered	not offered	E12	E12	not offered	not offered	not offered	not offered	not offered
E20	Multi-Measurement Server Mount for MP60 and MP70	standard	standard	standard	standard	standard	standard	E20	E20	not offered	not offered	not offered
E21	Bed Hanger Mount upgrade for MP20J, MP20 and MP30	E21	not offered	E21	E21	not offered	not offered	not offered	not offered	not offered	not offered	not offered
E22	Quick Release Mount	E22	not offered	E22	E22	standard	standard	standard	standard	not offered	not offered	not offered
E25	Battery Operation for the MP40/50 (4)	not offered	not offered	not offered	not offered	E25	E25	not offered	not offered	not offered	not offered	not offered
E31	Single CPU Upgrade	not offered	not offered	not offered	not offered	not offered	not offered			not offered		not offered
E32	Rev. B Performance Extension	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	E30(3)	not offered
E33	Rev. A Performance Extension	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	E30(3)	not offered
E34	Dual CPU Upgrade	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	E30(3)	not offered
E65	Battery Operation for the MP20/30 (4)	standard	not offered	E25	E25	not offered	not offered	not offered	not offered	not offered	not offered	not offered
E40	Multi-Measurement Server Mount for FMS	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	E20
E41	Cable Management for FMS	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	not offered	E15

(1) enable this option number with Support Tool (option number different to sales option)
(2) Not available in the US
(3) After hardware upgrade the unit becomes equivalent to the one shipped with this option
(4) batteries need to be ordered separately (M4605A)
(5) C04, C06 and C07 are exclusive
(6) C07 includes C02, C04, C06
(7) C15 includes C01
(8) comes with PS/2 IF (#J22)
(9) only for China, Taiwan and Hong Kong

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